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(Red)

08/MAR/94

**LEVEL 3
SITE INSPECTION PRIORITIZATION
AT
BISHOP TUBE COMPANY SITE
FRAZER, CHESTER COUNTY, PENNSYLVANIA**

PREPARED UNDER

ARCS CONTRACT NUMBER 68-W8-0092

WORK ASSIGNMENT NUMBER 92-31-3JZZ

CERCLIS NUMBER PAD081868309

USEPA DSN PA-0568

FOR THE

HAZARDOUS WASTE MANAGEMENT DIVISION
U.S. ENVIRONMENTAL PROTECTION AGENCY

SUBMITTED BY

(b) (4)

Environmental Scientist

REVIEWED BY

(b) (4)

Project Manager



TCN 4231-10

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1.0 INTRODUCTION

1.1 Authorization

Tetra Tech, Inc. (Tt) performed this work according to the United States Environmental Protection Agency (USEPA) Site Inspection Prioritization work assignment (#92-31-3JZZ) under Alternative Remedial Contracting Strategy (ARCS) Contract #68-W8-0092.

1.2 Scope of Work

It was assigned to conduct a Level 3 Site Inspection Prioritization (SIP) evaluation of the subject site.

1.3 Summary

The Bishop Tube Company site is located on Malin Road, south of Pennsylvania Route 30, in the borough of Frazer, Chester County, Pennsylvania. The site consists of a 13.7-acre parcel containing a 500,000-square foot plant building. Two inactive former surface impoundments are located on the property. A former degreaser unit, which consisted of an above-ground solvent storage tank and an underground degreaser tank, is located on site.

Several environmental studies have been conducted at the site. Betz, Converse, Murdoch, Incorporated (BCM, Inc.) conducted a hydrogeologic investigation in October 1981 in order to determine the effect, if any, of the two surface impoundments on the ground water at the site. During that investigation, elevated levels of volatile organic compounds (VOCs) were discovered in the ground water. Sixteen monitoring wells have been installed at the site and in the site vicinity for ground water quality monitoring and investigation. In 1988, BCM, Inc. conducted a ground water quality investigation at the site that concluded VOC contamination was most likely the result of leakage from the degreaser system, and that on-site soils had become contaminated as a result of the upward migration of contaminants from the shallow water table.

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The Tt SIP investigation focused on the ground water and surface water pathways. Several VOCs were detected in shallow and deep ground water downgradient of the former degreaser system, including 1,1,1-trichloroethane (TCA), tetrachloroethylene (PCE), and trichloroethylene (TCE). Manganese was also found in ground water underlying the site. Surface water and sediments were found to contain elevated levels of metals, including chromium, manganese, nickel, and zinc.

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2.0 SITE DESCRIPTION AND HISTORY

2.1 Site Location

The Bishop Tube Company site is located on Malin Road, south of Pennsylvania Route 30, in the borough of Frazer, Chester County, Pennsylvania. The 13.7-acre site is found on the Malvern, Pennsylvania quadrangle of the United States Geological Survey (USGS) topographic map at 40°02'25" north latitude and 75°32'18" west longitude, or by measuring 7-1/4 inches north and 5-1/4 inches west from the southeastern corner of the same quadrangle (Figure 2-1).¹

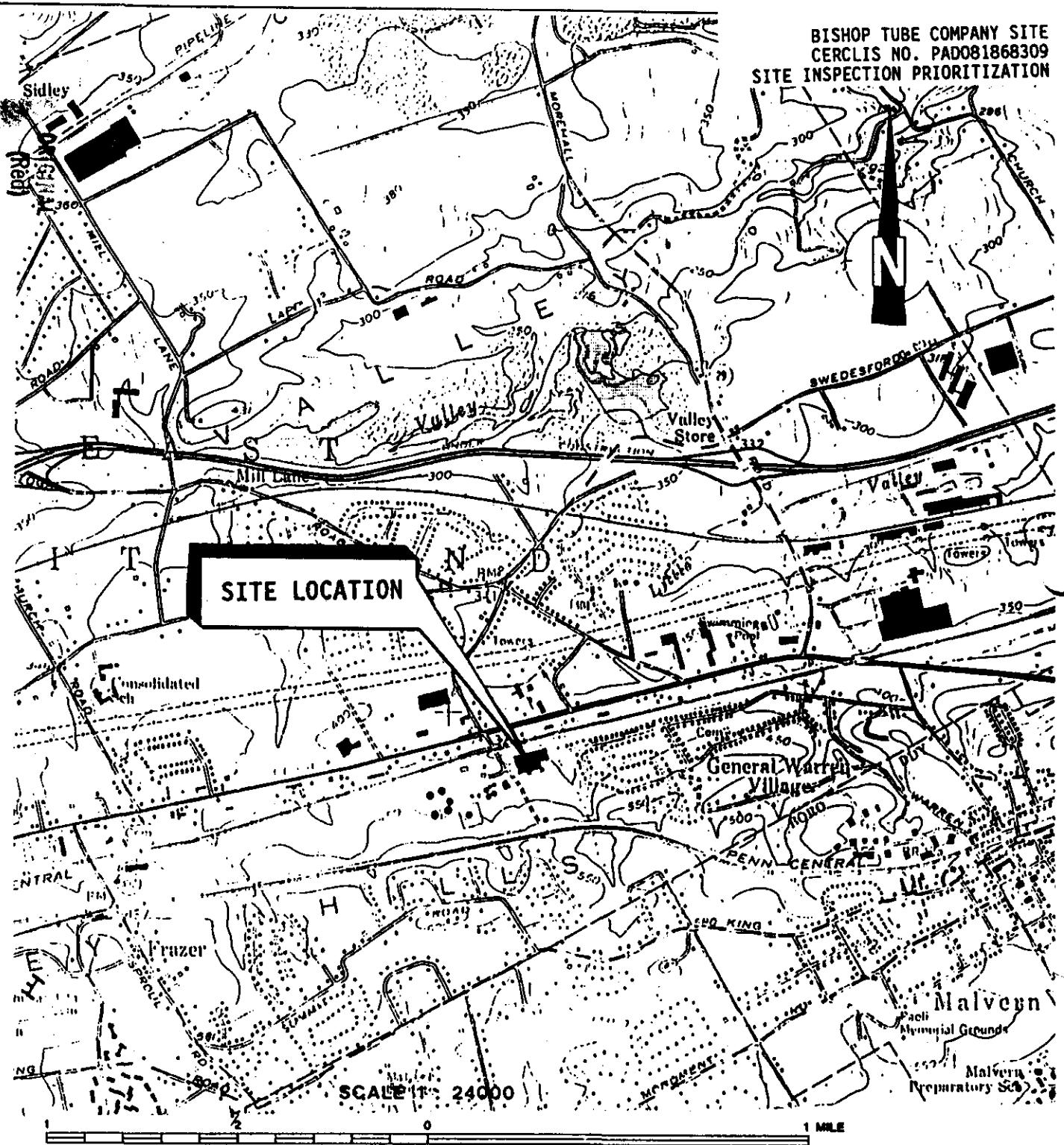
2.2 Site Layout

The site consists of a 13.7-acre parcel which contains an approximately 500,000-square foot plant building, and is surrounded on the northern and western sides by a chain-link fence (Figure 2-2). The site is bordered to the north by railroad tracks (Conrail Trenton Cutoff); to the east by Little Valley Creek and a wooded area; to the south by industrial properties; and to the west by Malin Road. At least 16 monitoring wells are located on or around the site. Two inactive former surface impoundments are located on the property: one on the southern side of the plant, and one under what is now the eastern side of the plant. A former non-contact cooling water discharge point is located along Little Valley Creek which flows northward through the eastern part of the property. A former degreaser unit, which consisted of a solvent storage tank outside the northern side of the plant, and an underground degreaser tank inside the plant building, is located on site. Access to the site is through two locked gates along Malin Road. The gates are locked while the plant is not operating.²

2.3 Site History

The site was developed in 1951 as J. Bishop and Company, Platinum Works, and was originally used for the processing of platinum. In 1967, the company name was changed to Matthey Bishop and Company and the site was used for the production of stainless-steel industrial seamless tubing. The site was owned and operated

BISHOP TUBE COMPANY SITE
CERCLIS NO. PADO81868309
SITE INSPECTION PRIORITIZATION

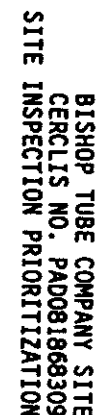


SOURCE: USGS TOPOGRAPHIC MAPS,
MALVERN, PENNSYLVANIA QUADRANGLE



TETRA TECH, INC.

FIGURE 2-1
SITE LOCATION MAP
BISHOP TUBE COMPANY SITE
FRAZER, CHESTER CO., PA



TETRA TECH, INC.

FIGURE 2-2
SITE SKETCH
BISHOP TUBE COMPANY
FRAZER, CHESTER COUNTY
PENNSYLVANIA

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for the same purpose by the Whittaker Corporation from 1969 until 1974. The site property has been owned by Christiana Metals Corporation since 1974. The plant was closed in 1991.^{2,3}

The business at the site was purchased at an auction by Damascus-Bishop Tube Company, a subsidiary of the Marcegaglia Group, in December 1992. Damascus-Bishop Tube Company leases the property from Christiana Metals Corporation. Operations at the site resumed in spring 1993. Approximately nine (9) persons work on site at this time, although more people will be employed at the site when full-scale operations begin.^{2,3}

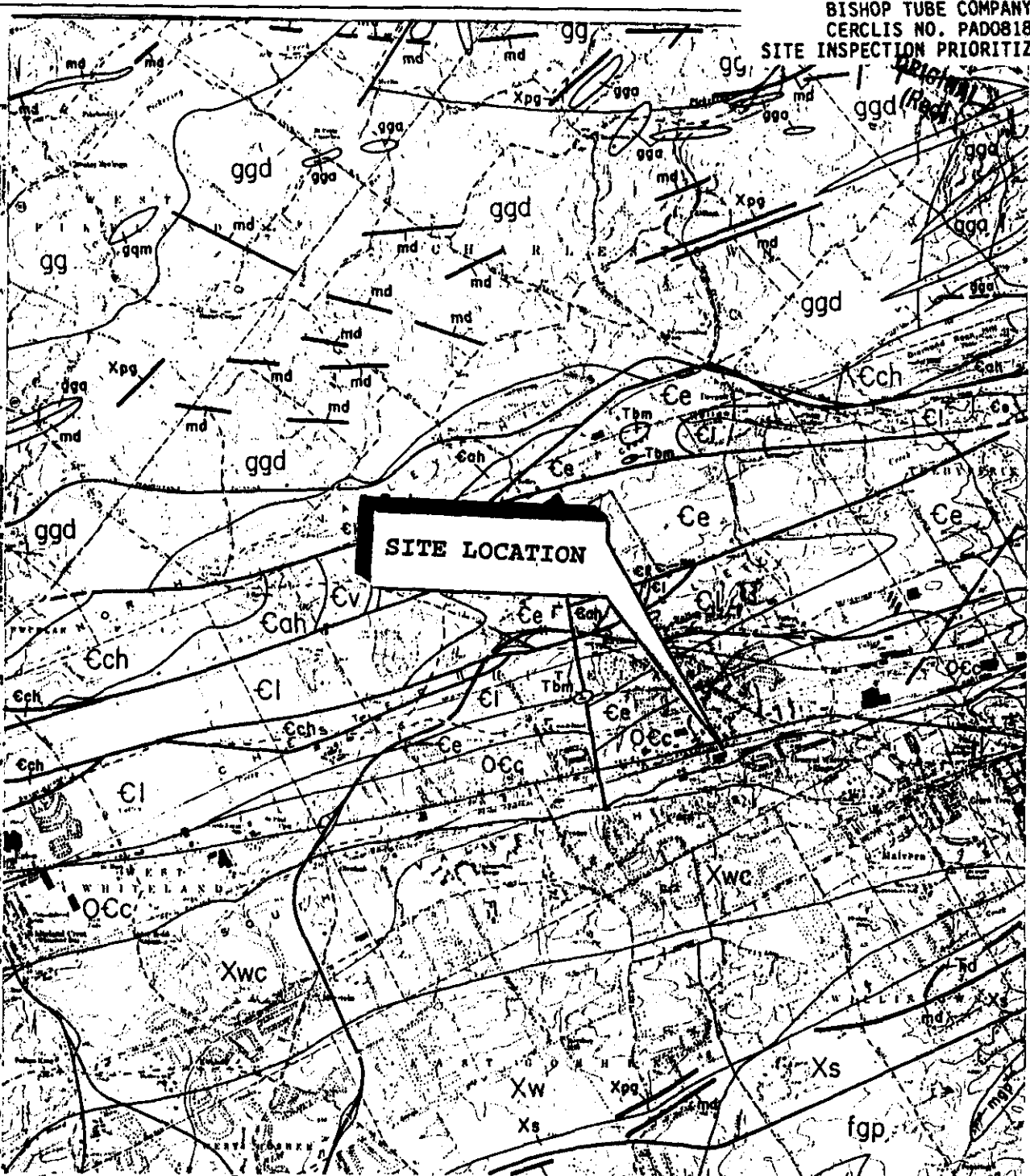
Several environmental studies have been conducted at the site. Betz, Converse, Murdoch, Incorporated (BCM, Inc.) conducted a hydrogeologic investigation under contract to Christiana Metals Corporation in October 1981 in order to determine the affect, if any, of the two surface impoundments on the ground water at the site. During that investigation, elevated levels of VOCs were discovered in the ground water. In 1988, BCM, Inc. conducted a ground water quality investigation at the site that concluded VOC contamination was most likely the result of leakage from the degreaser system, and that on-site soils had become contaminated as a result of the upward migration of contaminants from the shallow water table. The 1990 BCM, Inc. report entitled "Results of Implementation of Groundwater Remediation Work Plan Phase I" is included as Appendix A.^{3,4,5,6}

2.4 Geology

The Bishop Tube site lies within the Piedmont Lowland section of the Piedmont Physiographic Province (Figure 2-3). The topography of the Piedmont lowland is a mature, well-drained peneplain. The underlying rock types include limestone, dolomite, schist and gneiss. Prolonged differential erosion resulted in undulating to steeply rolling topography. The Chester Valley divides Chester County in half from northeast to southwest. The Chester Valley was formed by erosion of the limestone and dolomite of the Conestoga Formation. North of the valley, granodiorite and granodiorite gneiss rocks form the ridges and hills.

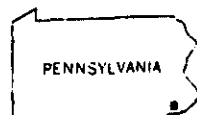
EXPLANATION

Tbm
Bryn Mawr Fm.
Ad
Diabase
Xs
Steckton Fm.
OCc
Conestoga Fm.
Ce
Elbrook Fm.
Cl
Ledger Fm.
Ck
Kinross Fm.
Cv
Vintage Fm.
Cch
Antietam and
Hagerstown Fms.
undiv.
Cch
Chickles Fm.
Xpg
Pegmatite
Xs
Serpentinite
Xwc
Wissahickon Fm.
albite-
chlorite schist
Xw
Wissahickon Fm.
oligoclase-
mica schist
md
Metadiabase
ggm
Quartz monzonite
and quartz
monzonite gneiss
ggd
Granodiorite
and
granodiorite
gneiss
ggg
Gabbroic gneiss
and gabbro
gd
Graphitic gneiss
fm
Franklin Marble
fgp
Felsic gneiss,
pyroxene-bearing
mqg
Mafic gneiss,
pyroxene-bearing



SITE LOCATION

SCALE 1:2500



QUADRANGLE LOCATION



TETRA TECH, INC.

FIGURE 2-3
GEOLOGIC MAP
BISHOP TUBE
FRAZER
CHESTER COUNTY
PENNSYLVANIA

SOURCE:
BERG T.M., DODGE C.M., 1981. MALVERN PENNSYLVANIA QUADRANGLE,
ATLAS OF PRELIMINARY GEOLOGIC QUADRANGLE MAP OF PENNSYLVANIA,
PENNSYLVANIA DEPARTMENT OF ENVIRONMENTAL RESOURCES

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South of the valley, the Wissahickon Formation forms the ridges and hills. The drainage pattern is dendritic.^{7,8,9}

The Conestoga Formation is exposed in the Chester Valley area. It extends the length of the valley, and west of Coatesville occupies the width of the valley. This middle-Cambrian to early-Ordovician formation includes an upper micaceous limestone, a middle phyllite, and a lower alternating sequence of limestone and dolomite. This formation dips steeply to the southeast near the site, and is estimated to be at least 500 feet thick. The Conestoga Formation has very low primary porosity and its permeability is attributable to secondary porosity (fractures, joints, and solution channels). Wells in the Conestoga Formation are utilized as sources of drinking water for domestic and public supplies.^{7,9}

The Wissahickon Formation is exposed in the hills south of the Chester Valley. It forms the southern wall of the Chester Valley from St. David to South Coatesville and continues westward into York County. This lower Paleozoic-aged formation is described as an albite-chlorite schist which contains some hornblende gneiss and granitic members. The thickness of the Wissahickon Formation is unknown because of intense folding and the lack of recognizable, recurrent beds. The Wissahickon Formation has very low primary porosity and its permeability is attributable to secondary porosity. The Wissahickon Formation is utilized as a source of drinking water for domestic and public supplies.^{1,4,6,8,9}

The site is located over the contact between the Wissahickon Formation and the Conestoga Formation. The northern portion of the site is underlain by the Conestoga Formation and the southern portion of the site is underlain by the Wissahickon Formation. The overburden consists of sandy soils and fill material, estimated to be 10 to 20 feet thick.^{4,8}

2.4.1 Soils

The soil at the site is mapped by the United States Department of Agriculture Soil Conservation Service as the Manor loam. The Manor series consists of deep well-drained soils developed from schist and gneiss bedrock. Depth to bedrock

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ranges from 4 to 10 feet where the soil is underlain by mica schist. This soil has a moderate permeability and a very low available water capacity.¹⁰

2.4.2 Groundwater

Ground water within the study area exists under artesian and water table conditions. Sources of ground water include the Conestoga Formation, the Wissahickon Formation and the unconsolidated overburden material. According to well inventories for central Chester County, sixteen wells screened in the Conestoga Formation ranged from 42 to 200 feet deep, yielding between 7 to 175 gallons per minute. The pH of the water ranged from 5.4 to 7.6, hardness from 17 to 308 parts per million (ppm), and specific conductance from 110 to 640 micromhos at 25°C. Forty one wells screened in the Wissahickon Formation ranged from 20 to greater than 100 feet deep, yielding from less than 1 gallon per minute to more than 80 gallons per minute. The pH of the water ranged from 5.0 to 7.4, hardness from 17 to 187 ppm and specific conductance from 20 to 370 micromhos at 25°C.^{3,5,9}

The ground-water at the site has been investigated by the installation of sixteen monitoring wells. The yields from these wells are not known.³

A summary of the on-site wells is provided below:³

WELL IDENTIFICATION	WELL DEPTH (FEET)	SCREENED INTERVAL (ft. below grade)	DEPTH TO GROUND WATER (ft. from top of casing)	MONITORED AQUIFER
MW-1	48	28 to 48	13.25	Wissahickon
MW-2	24	15 to 24	6.35	Conestoga
MW-3	13.5	8 to 13.5	6.10	unconsolidated
MW-4	20	7 to 20	10.71	Conestoga
MW-5	20	10 to 20	12.10	unconsolidated
MW-6	20.66	10.66 to 20.66	16.22	unconsolidated
MW-7	19.8	9.8 to 19.8	12.62	unconsolidated
MW-8	18	8 to 18	13.73	unconsolidated
MW-9	63	46 to 63	15.45	Conestoga
MW-10	15	5 to 15	2.52	Conestoga
MW-11	16	6 to 16	9.01	unconsolidated
MW-12	21	8 to 21	8.63	unconsolidated
MW-13	37	27 to 37	10.32	Conestoga
MW-14	15	5 to 15	9.12	unconsolidated
MW-15	78	68 to 78	0	Conestoga
MW-16	21	7 to 21	7.18	unconsolidated

Groundwater flow at the site in the overburden is northeastward, towards Little Valley Creek. Groundwater flow in the Conestoga Formation is towards the north-northeast. Measurements of the water levels at the monitoring well clusters indicate a downward gradient from the overburden into the bedrock. Based on these measurement, it appears that the unconsolidated overburden aquifer, the Wissahickon Formation and the Conestoga Formation are interconnected in the study area.^{4,5}

3.0 FIELD TRIP REPORT

3.1 Summary

On Wednesday, September 29, 1993, Tetra Tech, Incorporated personnel (b) (4) (b) (4)(b) (4)(b) (4)(b) (4)(b) (4)(b) (4)(b) (4)(b) (4)(b) (4)(b) (4) conducted sampling for a Level 3 SIP evaluation of the Bishop Tube Company site in Frazer, Chester County, Pennsylvania. Site access was granted by Mr. Russell Levering, plant engineer for the Damascus-Bishop Tube Company. The sampling team was accompanied by Mr. Bruce R. Cushing, P.G., of BCM, Inc., who collected split samples on behalf of Christiana Metals, the property owner. The weather at the time of the site visit was cool and sunny with temperatures in the 60°F. Photographs were taken on site (see Section 3.4 for the photo log).

A total of four (4) low-concentration solid environmental samples, nine (9) low-concentration aqueous environmental samples, and two (2) quality assurance/-quality control samples were collected. Samples are listed on Table 3-1. Well Sampling Log Sheets are included in Appendix B. Samples were submitted through USEPA's Contract Laboratory Program (CLP) to be analyzed for volatile organic compounds on USEPA's Target Compound List, and metals and cyanide on USEPA's Target Analyte List. In addition, ground-water samples from the monitoring wells were filtered and submitted for dissolved metals analyses. As proposed in the task work plan approved by USEPA, samples were not submitted for organic semi-volatile, pesticides, or polychlorinated biphenyls (PCBs) analyses. Sample locations are shown on Figure 3-1. QA/QC samples included a field blank, a trip blank, a duplicate solid sample, and a duplicate aqueous sample. In addition, extra volume for one solid sample and one aqueous sample, was sent to the laboratory for samples designated as matrix spike/matrix spike duplicate (MS/MSD) samples.

Sample analysis results are summarized in Appendix C.

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Table 3-1. Sampling Summary: Bishop Tube Company Site

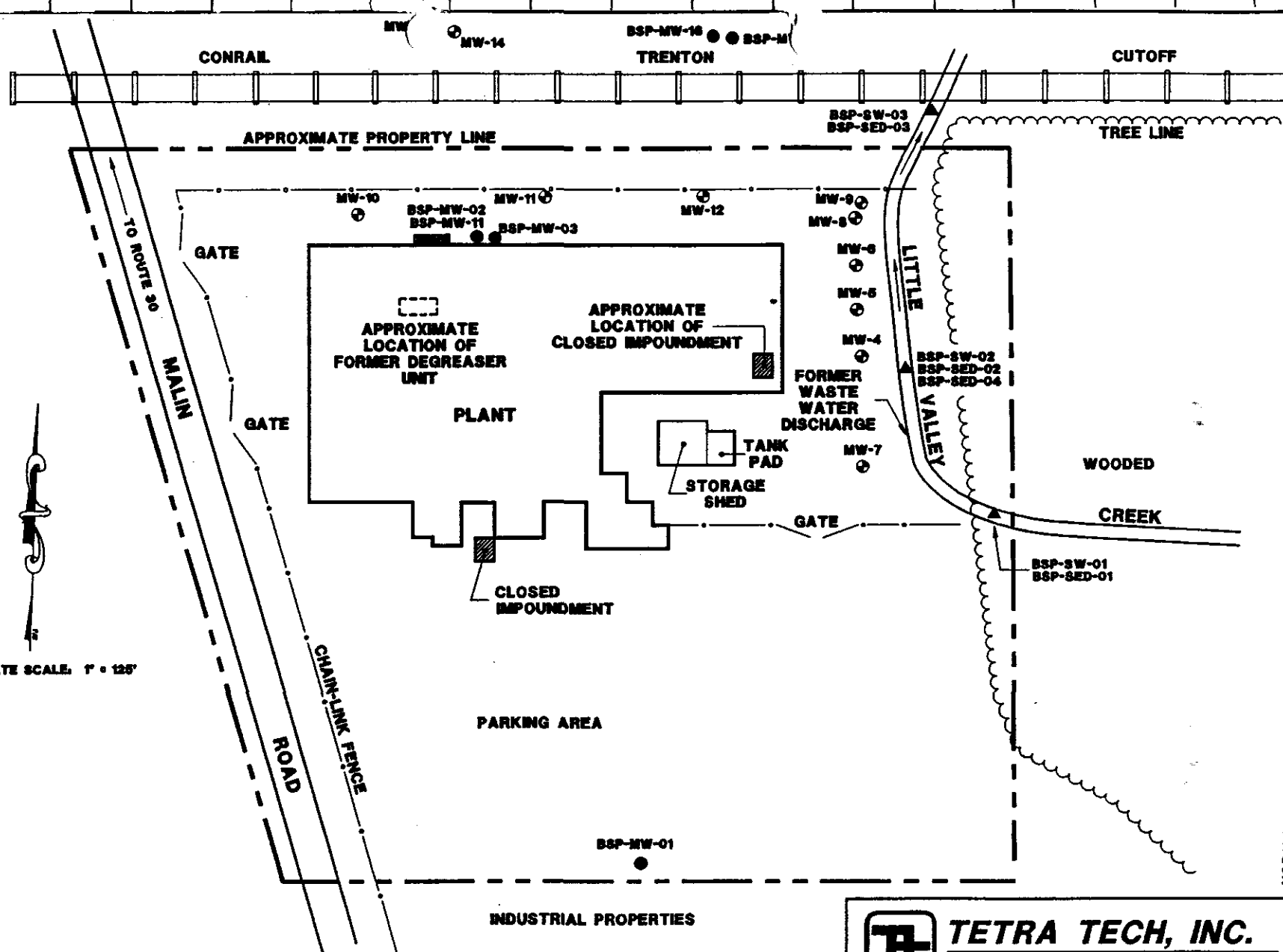
Organic CLP#	Inorganic CLP#	Dissolved Metals CLP#	Sample Designation	Matrix	Sample Location	Sample Description	Field Measurements
CNA97			BSP-TB-01	AQUEOUS	TRIP BLANK	-	-
CNA90	MCLF80	MCLF86	BSP-FB-01	AQUEOUS	FIELD BLANK	-	-
NA51	MCLF51	MCLF46	BSP-MW-01	AQUEOUS	Bishop Tube Co. monitoring well 01 Background well Approximately 300 feet south of plant building	clear, odorless	Temp: 12.0 C Cond: .087 pH: 6.11
CNA55	MCLF55	MCLF50	BSP-MW-15	AQUEOUS	Bishop Tube Co. monitoring well 15 Approximately 200 feet north of plant building (off site)	clear, odorless	Temp: 13.0 Cond: 3.59 pH: 7.14
CNA56	MCLF56	MCLF99	BSP-MW-16	AQUEOUS	Bishop Tube Co. monitoring well 16	clear, odorless	Temp: 13.8 Cond: not taken pH: 7.26
CNA52	MCLF52	MCLF47	BSP-MW-02	AQUEOUS	Bishop Tube Co. monitoring well 02 on-site well in former TCE tank area adjacent to northern side of building	clear, odorless	Temp: 15.9 Cond: 0.467 pH: 7.13 PID reading: 2.8 ppm
CNA54	MCLF54	MCLF49	BSP-MW-21	AQUEOUS	Duplicate of BSP-MW-02	Duplicate of BSP-MW-02	Duplicate of BSP-MW-02
CNA53	MCLF53	MCLF48	BSP-MW-03	AQUEOUS	Bishop Tube Co. monitoring well 03	clear, odorless	Temp: 17.6 Cond: not taken pH: 7.40
CNA58	MCLF58	N/A	BSP-SW-03	AQUEOUS	Downstream of site Approximately 10 feet northeast of property	clear, odorless	no PID readings above background
CNA63	MCLF63	N/A	BSP-SED-03	SEDIMENT	same as BSP-SW-03	brownish-gray, silty clay	no PID readings above background
CNA59	MCLF59	N/A	BSP-SW-02	AQUEOUS	on site, approximately 30 feet north (downstream) of cooling water outfall	clear, odorless	no PID readings above background
CNA62	MCLF62	N/A	BSP-SED-02	SEDIMENT	same as BSP-SW-02	brown, silty sand small metallic shavings present	no PID readings above background
CNA57	MCLF57	N/A	BSP-SW-01	AQUEOUS	wooded area approximately 25 feet upstream of property line	clear odorless	no PID readings above background
CNA61	MCLF61	N/A	BSP-SED-01	SEDIMENT	same as BSP-SW-01	brown, sandy silt	no PID readings above background

PID = Photo Ionization Detector Cond = Conductivity Temp = Temperature
PPE = Probable Point of Entry (site drainage)

BISHOP TUBE COMPANY SIT
CERCLIS NO. PAD0818683C
SITE INSPECTION PRIORITIZATION

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APPROXIMATE SCALE: 1" = 125'

**LEGEND**

FORMER SOLVENT STORAGE TANK PAD

MONITORING WELL AND NUMBER

SURFACE WATER/SEDIMENT SAMPLE

MONITORING WELL SAMPLE

**TETRA TECH, INC.****FIGURE 3-1**

**SAMPLE LOCATION PLAN
BISHOP TUBE COMPANY
FRAZER, CHESTER COUNTY
PENNSYLVANIA**

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BISHOP TUBE COMPANY SITE
CERCLIS NO. PAD081868309
SITE INSPECTION PRIORITIZATION

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3.2 Persons Contacted

3.2.1 Prior to Field Trip

Mr. Russell G. Levering
Plant Engineer/Buyer
Damascus-Bishop Tube Company
P.O. Box 1189
Route 30 & Malin Road
Frazer, Pennsylvania 19355
(215) 647-3450

Mr. Mike Giuranna
Site Assessment Manager, Region III
USEPA
841 Chestnut Building
Philadelphia, Pennsylvania 19107
(215) 597-3165

Mr. John J. McAleese III
Attorney
Morgan, Lewis & Bockius
2000 One Logan Square
Philadelphia, PA 19103
(215) 963-5094

Mr. George Danyliw
Pennsylvania Department of
Environmental Resources
Lee Park, Suite 6010
555 North Lane
Conshohocken, PA 19428
(215) 832-6212

3.2.2 At the Site

Mr. Bruce R. Cushing, P.G.
BCM, Inc.
One Plymouth Meeting
Plymouth Meeting, PA 19462
(215) 825-3800

Mr. Russell G. Levering
Plant Engineer/Buyer
Damascus-Bishop Tube Company
P.O. Box 1189
Route 30 & Malin Road
Frazer, Pennsylvania 19355
(215) 647-3450

Mr. John J. McAleese III
Attorney
Morgan, Lewis & Bockius
2000 One Logan Square
Philadelphia, PA 19103
(215) 963-5094

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3.3 Site Observations

- The solvent cleaning system is no longer in use; the above-ground TCE tank has been removed.
- Monitoring Well MW-15 was an artesian well; water began flowing from the top of the casing when the cap was removed.
- Drainage from the site flowed into Little Valley Creek on the eastern side of the site.
- The site was active at the time of the sampling visit.
- The site was approximately 90 percent paved.
- Access to the site was restricted by a chain-link fence.

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PAGE #

IMAGERY COVER SHEET
UNSCANNABLE ITEM

Contact the CERCLA Records Center to view this document.

SITE NAME Bishop Tube Co.
OPERABLE UNIT 00
SECTION/BOX/FOLDER 1C 1 1.001 (8A)

REPORT OR DOCUMENT TITLE Site inspection prioritiza-
tion.
DATE OF DOCUMENT 3-8-84
DESCRIPTION OF IMAGERY Site Photos
NUMBER AND TYPE OF IMAGERY ITEM(S) 7 Photographs

4.0 WASTE CHARACTERISTICS

Three potential sources of contamination have been identified at the site: the former surface impoundments; the former degreaser system; soil that has become contaminated with VOCs which have leaked or been spilled from the degreaser system.; and the former wastewater discharge.

4.1 Surface Impoundments

Process waste and sanitary sewage were reportedly disposed into two unlined surface impoundments until 1979. One surface impoundment (cesspool), formerly was located on the southern side of the plant, has been filled with lime and covered with concrete. This area was reportedly 160 square feet in size. The second surface impoundment was located on the eastern side of the plant and was covered when the building was extended in that direction. This impoundment was allegedly 200 square feet in size. Wastes known to have been disposed into either or both impoundments include cooling water and acid pickling waste. The 1988 groundwater quality investigation report, prepared for Christiana Metals Corporation by BCM, Inc. concluded that metals contamination of on-site soils was associated with the former "infiltration basins" (surface impoundments) at the site. Soils at the site have been found to contain elevated levels of chromium, copper, and nickel. ^{3,4,5}

Because both impoundments have been covered with lime and concrete, they were not sampled as part of this SIP investigation.

4.2 Degreaser System

A hydrogeologic study performed by BCM, Inc. in 1988, concluded that VOC contamination of ground water underlying the site was most likely the result of leaking or spillage around a former degreaser system. The degreaser system consisted of a solvent storage tank, located on a pad on the northern side of the plant, and a degreaser tank, located in a sub-basement in the plant. The solvent reportedly contained TCE and PCE; the exact make-up of the solvent is unknown.

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5.0 GROUNDWATER PATHWAY

5.1 Likelihood of Release

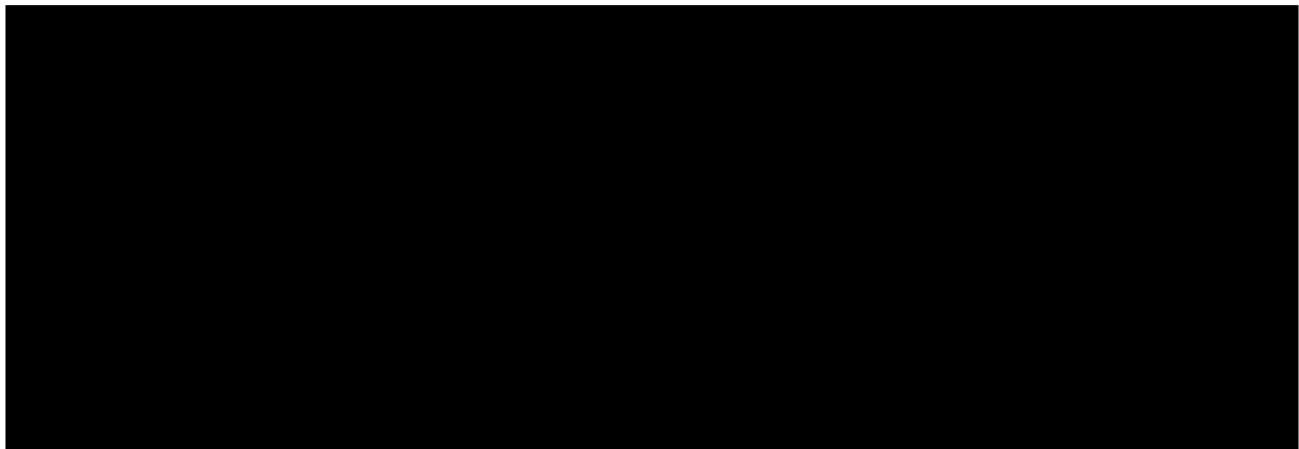
The following contaminants were detected in ground water underlying the site.

ALL IN UG/L

CONTAMINANT	MW-1 background	MW-2	MW-3	MW-15	MW-16
1,1-Dichloroethene	ND (10)	810 J	60	170 J	270 J
1,1-Dichloroethane	ND (10)	360 J	11	30	73
1,2-Dichloroethene	ND (10)	1,100	560 J	700 J	180
1,1,1- Trichloroethane	ND (10)	35,000	790	3,700	4,200
Trichloroethylene	ND (10)	29,000	13,000	13,000	3,900
1,1,2- Trichloroethane	ND (10)	26	ND	12	ND
Tetrachloroethylene	ND (10)	55	5	15	7
Manganese	ND (15)	2,900	1,540	2,160	ND

ND = not detected above the sample quantitation limit (SQL)
number in parentheses is the SQL
J = estimated concentration

5.2 Receptors



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6.0 SURFACE WATER PATHWAY

6.1 Likelihood of Release

Runoff from the site flows into Little Valley Creek which borders the eastern edge of the site. Little Valley Creek flows approximately 4.0 stream-miles into Valley Creek. Valley Creek flows approximately 3.0 stream-miles into the Schuylkill River. The Schuylkill River flows out of the study area.^{1,2}

From 1979 until approximately 1991, wastewater containing heavy metals including chromium, copper, manganese, nickel, and zinc, was discharged to Little Valley Creek on site.¹¹

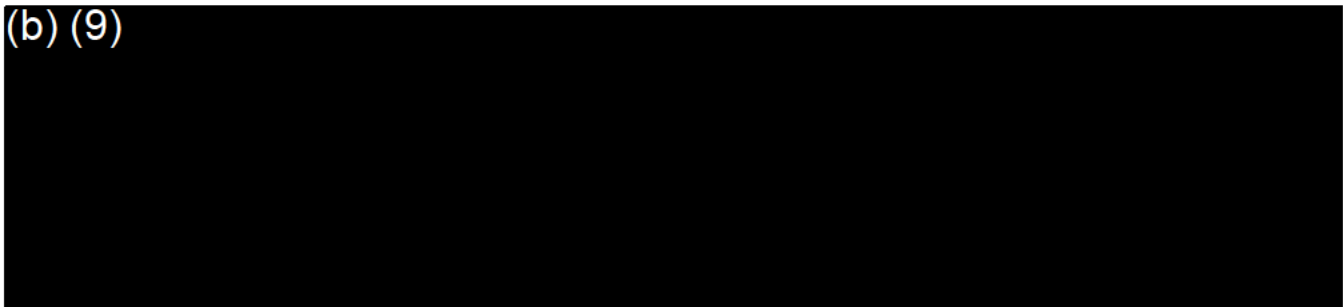
The following contaminants were found in surface water downstream from the site in significantly above upstream concentrations: chromium (up to 18.4 µg/l); manganese (up to 90.4 µg/l); nickel (up to 53.5 µg/l); and zinc (up to 33.7 µg/l).

Elevated levels of chromium (up to 165 milligrams per kilogram [mg/kg]) and nickel (up to 128 mg/kg) were found in downstream sediments.

6.2 Receptors

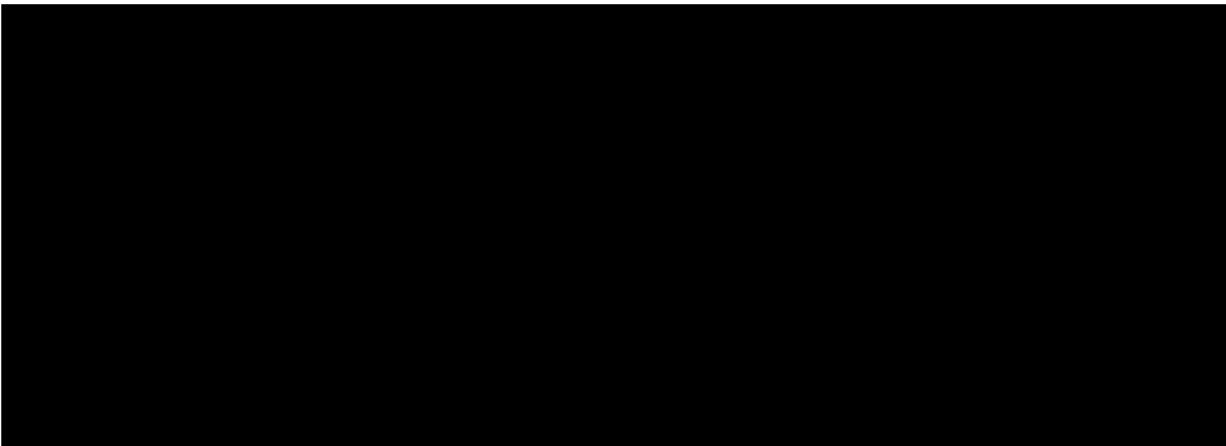
6.2.1 Drinking Water Receptors

(b) (9)

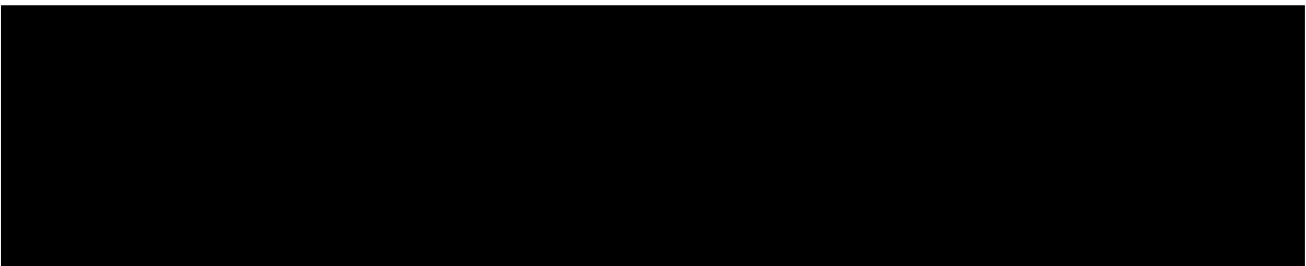


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7.0 AIR PATHWAY



Populations were estimated by multiplying the number of houses as counted on the USGS topographic maps by the county average number of persons per household (2.73 for Chester County). Populations for metropolitan areas which appear pink on the topographic maps were estimated using a fraction of the total population of the city, township, or borough based on the area of the demographic unit within the specified distance from the site. All population estimates were based on 1990 US Census data.^{1,14,21}



Two federally-listed endangered birds are expected to be found as transient species in the project area. They are the bald eagle (*Haliaeetus leucocephalus*) and the peregrine falcon (*Falco peregrinus*). A federally endangered mammal, the Indiana bat (*Myotis sodalis*), could potentially be a transient on the site. An orchid, the small whorled pogonia (*Isotria medeoloides*) is also listed as occurring in Chester County. There is no known critical habitat for these species in the study area. There are no significant wetlands within one mile of the site.^{17,22}

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APPENDIX A

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Christiana Metals Corporation
BISHOP TUBE FACILITY
Frazer, Pennsylvania

Results of Implementation of Groundwater Remediation Work Plan Phase I

Submitted To:
The Pennsylvania Department of Environmental Resources

January 1990



Engineers, Planners, Scientists
and Laboratory Services

REPORT

FEB 05 1990

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RESULTS OF IMPLEMENTATION OF GROUNDWATER REMEDIATION WORK PLAN PHASE I

FOR

CHRISTIANA METALS CORPORATION
BISHOP TUBE FACILITY
FRAZER, PENNSYLVANIA

JANUARY 1990

BCM PROJECT NO. 00-6471-01

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EXECUTIVE SUMMARY

BCM Engineers Inc. (BCM) implemented Phase I: Additional Investigations of the June 1989 Groundwater Remediation Work Plan from July through September 1989 for the Christiana Metals Corporation (Christiana) at its Bishop Tube Facility in Frazer, Pennsylvania. The investigation included the completion of eight soil borings, analysis of soil samples, installation of seven monitoring wells, and sampling of the monitoring wells for the presence of volatile organic compounds (VOCs). The results of the investigation determined the presence of VOCs in every groundwater monitoring well sample collected except the upgradient well sample. Each well contained one or more VOCs in concentrations exceeding the primary drinking water maximum contaminant levels (MCLs) established by the U.S. Environmental Protection Agency (EPA). The VOC contaminant plume in groundwater extends to the northeast from the apparent source areas where an aboveground solvent storage tank and a degreaser tank are located. Soil sample analytical results indicated the presence of VOCs in soil apparently caused by upward migration of volatilized VOCs from the contaminated groundwater into the soils.

BCM recommends that additional investigation be implemented to determine the downgradient (offsite) and vertical extent of the plume in the aquifer and to determine proposed groundwater cleanup levels. BCM also recommends proceeding with Phase II: Aquifer Testing to expedite remediation of the highest levels of VOC-contamination detected in onsite groundwater.

1.0 INTRODUCTION

This report presents the results of implementation of Phase I: Additional Investigations of the June 1989 Groundwater Remediation Work Plan for the delineation of volatile organic compound (VOC) contamination in soil and groundwater at Christiana Metals Corporation's Bishop Tube Facility in Frazer, Pennsylvania. The report describes monitoring well installation and soil boring activities, describes sampling activities, discusses the results of the investigation, and provides conclusions and recommendations for additional activities.

1.1 BACKGROUND

In 1981, BCM performed an investigation of the impact of closed waste impoundments on surface water and groundwater at the Bishop Tube plant site in Frazer, Pennsylvania (BCM, 1981) (Figure 1). With the approval of the Pennsylvania Department of Environmental Resources (PADER), four shallow monitoring wells were installed at that time. ~~The results of the study were presented in a 1981 BCM report which documented groundwater fluoride levels (maximum concentration 25.1 milligrams per liter (mg/l) in excess of the drinking water standard of 2.0 mg/l in one well).~~

In 1987, elevated concentrations of fluoride were detected in shallow groundwater collected at a sump within the plant. Due to an inadvertent connection between the sump and the plant's NPDES-permitted non-contact cooling water discharge, the discharge exceeded the permitted average monthly limit of 10.0 mg/l for fluoride. Bishop Tube has been pumping the sump water to storage for offsite hauling and treatment.

In cooperation with PADER, the July 1987 Work Plan (BCM, 1987) was developed to install additional monitoring wells, collect soil samples in the vicinity of the abandoned waste impoundments, and collect and analyze water samples from the monitoring wells and the adjacent stream. The purpose of the investigation was to update the 1981 study and extend the effort to include other possible groundwater contaminants, such as the degreasing agents used at the plant. PADER's approval of the Work Plan was obtained prior to commencing the project.

~~In May 1988,~~ BCM presented a report entitled Groundwater Quality Investigation to Bishop Tube (BCM, 1988). The work described in the May 1988 report was conducted in accordance with BCM's PADER-approved, July 1987 Work Plan. The investigation included installing and sampling 5 groundwater monitoring wells, MW-5, MW-6, MW-7, MW-8, and MW-9, at the locations shown in Figure 2, to complement the four existing wells at the site. Five soil borings were drilled and samples were retained for laboratory analysis, and five stream samples were collected and analyzed. The soil boring locations and the stream sampling locations are also shown on Figure 2.

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The May 1988 report concluded that Bishop Tube was the apparent source of trichloroethene (TCE) and 1,1,1-trichloroethane (TCA) contamination in groundwater. Data evaluation revealed areas with some metals contamination. The metals contamination in soils appears to be associated with plant operations at the former infiltration basins on the plant site.

Christiana Metals Corporation (Christiana), the former parent company of Bishop Tube, authorized BCM to continue with the next phase of this project by preparing a work plan to delineate the extent of TCE and TCA-bearing groundwater and to develop mitigation measures. The draft Work Plan was prepared by BCM and submitted to PADER during a meeting between representatives of PADER, BCM, and Christiana on July 26, 1988. During this meeting, PADER requested that Bishop Tube conduct quarterly monitoring in the vicinity of the east end of the plant where the cooling water discharges to the stream. This monitoring was requested to document levels of fluoride in groundwater which were anticipated to decrease with time as a result of improvements made in the company's pickle liquor handling practices, the presumed source of the fluoride.

Prior to submission of a Revised Work Plan addressing the PADER requests concerning quarterly monitoring, BCM conducted a soil vapor survey (SVS) in October 1988 along the north side of the facility as proposed in the July 1988 Draft Work Plan. The results of the SVS indicated the presence of low levels of soil contamination (TCE, PCE, and trans-1-2- dichloroethene) within areas of limited lateral extent adjacent to the above-ground Solvent Storage tank, loading area, and concrete storage pad.

BCM's revised Draft Groundwater Remediation Work Plan, dated May 31, 1989, was submitted to Christiana for review and comment. The final Groundwater Remediation Work Plan (Work Plan) was submitted to PADER in June 1989 (BCM, 1989). The final Work Plan, proposed the installation of seven additional groundwater monitoring wells (five shallow wells and two deep wells) numbered MW-10 through MW-16. Also proposed were five soil borings along the north side of the facility in areas identified during the SVS as containing low levels of VOC contamination. During implementation of the Work Plan, three additional soil borings were added to the work scope and were drilled adjacent to the degreaser tank located inside the plant. All soil borings and well locations are shown on Figure 2. The Work Plan also proposed the quarterly groundwater monitoring to be conducted at the east end of the plant and in the vicinity of the NPDES-permitted cooling water discharge.

1.2 OBJECTIVES

The primary objective of this study was to characterize VOC contamination in groundwater and provide recommendations for additional investigations and/or remedial activities. Specific objectives of the study were as follows:

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- Determination of potential source area(s) of VOC contamination in the groundwater
- Document shallow and bedrock aquifer water qualities
- Document groundwater flow directions
- Document soil quality in potential source areas
- Implement a quarterly groundwater monitoring program at the east end of the plant and in the NPDES-permitted cooling water discharge area and present the results of the first quarterly sampling results.

2.0 GEOLOGIC SETTING

2.1 GEOLOGY/HYDROGEOLOGY

The Bishop Tube site is located close to the northern base of South Valley Hills. There are two formations in the area, the Wissahickon Formation, a muscovite schist with minor quartz and feldspar and the Conestoga Formation, a crystalline limestone. The Pennsylvania Geological Survey (BERG, 1981) identifies the contact between the Wissahickon and Conestoga Formations to be on the south side of the plant.

The Wissahickon Formation is a medium-to-coarse-grained, banded rock, which is characterized by large amounts of mica and considerable amounts of feldspar. The primary porosity of the rock itself is relatively low. However, abundant secondary porosity structures (joints) within the rock provide openings for the storage and circulation of water. Generally, the size and frequency of joint structures decrease with depth, which in turn, reduce the water-yielding capacity of the formation. The planes of schistosity within the Wissahickon Formation may contain water, but they are generally subcapillary in size and do not yield it freely.

Competent rock belonging to the Wissahickon Formation was encountered in MW-1 on the south side of the plant. A thin and highly weathered zone of the Wissahickon Formation is present beneath most of the northern portion of the site immediately overlying the Conestoga Formation. The Wissahickon Formation encountered on the north side of the plant appears to be colluvium which has migrated downslope from the Wissahickon Formation outcrop on the south side of the plant. The colluvium is thickest on the eastern side of the plant in the vicinity of the stream.

The Conestoga Formation, a dolomitic and shaley limestone, is part of the limestone group that supplies the largest springs in southeastern Pennsylvania. The Conestoga Formation has low primary porosity and, therefore, groundwater migration is mainly through secondary porosity which results from the development of dissolution channels and fractures in the rock. Wells drilled in this rock have yields ranging from less than one gallon per minute (gpm) to 300 gpm (HALL, 1973), depending on the number and size of solution channels or fractures intersected by the well.

The monitoring wells and borings installed at the site indicate that approximately 10 to 20 feet of overburden is present throughout much of the site. Bishop Tube personnel reported that the southwest corner of the lower portion of the plant is set into the limestone and blasting of the rock was required to construct the plant foundation in this area.

The fill and underlying weathered schist are thickest at the northeast corner of the plant in the vicinity of MW-9. The varying amount of overburden soil and fill is probably due to the site's location on a moderately steep slope and the necessity for cut and fill grading during construction of the plant.

A zone of weathered rock, commonly called saprolite exists on top of bed-rock throughout much of the area. The saprolite has a lower permeability than the overlying material as evidenced by the presence of perched water at the overburden/saprolite interface. The yields of shallow monitoring wells completed in the perched water zone are typically 0.5 to 1 gpm while wells completed in fractured bedrock below the saprolite generally yield more than 15 gpm.

2.2 SOILS

Soils in the vicinity of the Bishop Tube site are categorized as belonging to the Manor Loam and Conestoga Silt Loam soil units (SCS, 1963).

The Manor Loam is a very fine sandy loam soil and is characteristically found above the Wissahickon Formation. The Manor Loam is a well-drained soil that is moderately permeable and has a moderately low moisture capacity. The Manor Loam is easily eroded from slopes, which explains why it is mainly found on level to gently sloping areas.

The Conestoga Silt Loam covers most of the area immediately north of the plant. This soil unit consists of a well-drained silt loam surface soil and a fine, sandy, clay subsoil. It is moderate in available moisture capacity and has a moderately rapid permeability.

3.0 METHODS OF INVESTIGATION

3.1 TEST BORINGS AND SOIL SAMPLING

Eight soil test borings were drilled at Bishop Tube from August 1 through 18, 1989. Five of the soil borings were installed along the north side of the plant, and three of the borings were installed within the plant in the vicinity of the finished product degreaser tank (Figure 2).

Soil borings along the north side of the plant were drilled with 4.25-inch inside diameter (ID), hollow stem augers. Soil test borings installed inside the plant were installed with 3.25-inch ID hollow stem augers. During test boring drilling, soil samples were collected with 2-inch outside diameter (OD), high carbon steel, split barrel (split-spoon) samplers. A lithologic description of the soil contained in each splitbarrel was recorded by a geologist. Test boring logs providing soil classification, depth to water, boring dimensions, drilling equipment, backfilling methods, and other data are provided in Appendix A.

Representative samples from each split-barrel were placed in glass jars and sealed for the purpose of conducting head space analysis measurements of the relative concentration of VOCs in each sample jar air space. This test provided qualitative information on the relative levels of VOCs in the sampled soil. Following a 10- to 15-minute waiting period to allow any VOCs present in the soil to volatilize into the headspace between the soil sample and the jar lid, each jar was opened and an organic vapor detector (OVA) flame ionization detector probe was inserted into the sample jar head space to remove and analyze a sample of the accumulated vapor. The results of the head space analyses were recorded in the field logbook and are summarized in Table 1.

Selected split-barrel soil samples from each test boring were collected for laboratory analyses. Soil samples were removed from the split-barrel by the onsite geologist using a properly decontaminated stainless steel hand trowel and placed in laboratory cleaned and properly labelled sample jars. All field duplicate samples were composited in properly decontaminated stainless steel mixing bowls. Aliquots of soil for VOC analyses were not composited. Aliquots of soil for VOC analyses were removed from the split-barrel and placed in the proper sample container immediately upon opening the split-barrel soil sampler. All soil samples and field quality assurance/quality control (QA/QC) samples were collected, handled, stored, and transported as specified in the PADER- approved QA/QC Plan and Reporting Deliverables (QA/QC Plan) document contained in Appendix B of the June 1989 Groundwater Remediation Work Plan.

All sampling equipment was decontaminated as specified in the QA/QC Plan. All samples were placed in a chilled environment and transported by the sampler to the BCM Laboratory in Norristown, Pennsylvania.

All onsite work was conducted in accordance with BCM's site-specific Health and Safety Plan, contained in Appendix B.

All soil borings were advanced to the surface of bedrock or auger refusal, whichever was encountered first. Upon encountering one of these conditions, the augers were removed from the borehole and, if the boring was not to be used as a monitoring well location, a 90 percent neat cement/10 percent powdered bentonite grout was pressure tremied from the bottom of the borehole to ground surface. All soil cuttings were then placed in sealed 55-gallon drums for subsequent disposal.

Ground surface elevations and horizontal locations of all boring locations were surveyed by a Pennsylvania-licensed surveyor, and are presented in Table 2. In addition, the vertical elevations of the three stream sampling locations sampled as part of earlier investigation activities were also surveyed and are also presented in Table 2.

3.2 MONITORING WELL INSTALLATION

Seven groundwater monitoring wells were installed on or in the vicinity of the Bishop Tube site from August 2 through 8, 1989. A total of 16 groundwater monitoring wells are now incorporated into the groundwater monitoring well network associated with the hydrogeological investigation being conducted at the Bishop Tube site. Of the seven new monitoring wells installed as part of this investigation, four were installed to monitor the shallow unconsolidated aquifer present in the weathered shist and soil and three were installed to monitor the deeper limestone rock aquifer. Four of the monitoring wells were incorporated into two well clusters, located across the Consolidated Railroad (Conrail) railroad tracks to the north of the site. Each of the well clusters consists of one deep well completed in the Conestoga aquifer and one shallow monitoring well completed immediately above the contact between the overlying unconsolidated soil aquifer and the underlying limestone rock aquifer.

Each of the deep rock aquifer monitoring wells was constructed inside an 6-inch boring drilled using air percussion drilling techniques. The shallow monitoring wells were installed inside 6.25-inch borings drilled with hollow stem augers. Well drilling logs for each monitoring well are presented in Appendix A. Schematic as-built monitoring well diagrams are presented in Figures 3 and 4 for the shallow and deep monitoring wells, respectively.

Generally, each monitoring well was constructed with approximately 10 feet of 4-inch ID, threaded flush joint, 20-slot (0.020 inch), Schedule 40 PVC screen, and 4-inch ID, threaded flush joint, Schedule 40 PVC casing (riser). After inserting the screen and casing, a sand pack of No. 1 Jessie Morie silica sand was installed in the annular space from the bottom of the borehole to approximately two feet above the screen. An approximately 2-foot thick bentonite pellet seal was installed immediately above the sand pack. The bentonite seal was moistened with water if it was above the static water level and allowed to sit undisturbed for approximately 10 minutes to allow the bentonite to expand and seal the borehole.

Following installation of the bentonite seal, a grout consisting of 90-percent neat cement/10-percent bentonite was pressure grouted via a tremie from the top of the bentonite seal to the ground surface. A locking, protective steel casing was installed from approximately 3 feet below ground surface to approximately 2 feet above ground surface, and concrete collars were installed around each protective casing. At selected wells, vehicle access requirements necessitated installation of flush-mounted protective steel casings with locking caps.

The rock monitoring wells MW-13 and MW-15 were constructed using a double casing technique. A 10-inch diameter borehole was drilled through overburden and into competent rock. A 6-inch ID steel casing was installed in the borehole and the annulus around the casing was tremie grouted with a cement/bentonite. A 6-inch diameter borehole was drilled through the steel casing to the desired well completion depth in rock.

Following the installation of all the monitoring wells, each well was developed for approximately 1 hour with either a centrifugal or submersible pump. Well development water was placed in sealed 55-gallon drums for subsequent disposal by Christiana. All downhole well development equipment was properly decontaminated prior to its insertion into each well.

All soil and rock cuttings generated during the drilling of each well were placed in sealed 55-gallon drums for subsequent disposal by Christiana.

All monitoring wells were surveyed by a Pennsylvania-licensed surveyor. The horizontal location of each well was surveyed to the nearest 0.01 foot and the elevations of ground surfaces, inner PVC casings, and outer steel casings, were surveyed to the nearest 0.01 foot above mean sea level. Table 3 presents a summary of the monitoring well elevations.

3.3 GROUNDWATER SAMPLING

As specified in the Work Plan, all new groundwater monitoring wells (MW-10 through MW-16) and groundwater monitoring wells MW-2 and MW-3 were sampled twice. In addition, previously existing groundwater monitoring wells MW-1 and MW-4 through MW-9 were sampled once during the first round of groundwater sampling to initiate the PADER-required quarterly groundwater monitoring program in the pickle liquor handling area. The first round of groundwater sampling was conducted on August 29 and 30, 1989. The second round of groundwater sampling was conducted on September 28, 1989.

Prior to collecting groundwater samples, total well depth and depths to the top of the water columns were measured and recorded, and the volume of water in each well was calculated and recorded. All wells, except MW-13 and MW-15, were purged of a minimum of approximately three well volumes prior to groundwater sampling with either a peristaltic pump or PVC bailer. Approximately two well volumes of groundwater were purged from wells MW-13 and MW-15 prior to sample collection.

During the pumping of each well, the pH, specific conductance, and temperature of the groundwater were measured. Field data sheets are provided in Appendix C. All purge water was placed in sealed 55-gallon drums for subsequent disposal by Christiana. All downhole purging equipment was decontaminated in accordance with the QA/QC Plan contained in Appendix B of the Work Plan.

Groundwater sampling was conducted using laboratory cleaned, dedicated, 2-inch outside diameter (OD) Teflon bailers. Groundwater samples were collected, handled, stored, and transported in accordance with QA/QC protocols contained in Appendix B of the Work Plan. All Chain-of-Custody documentation is provided in Appendix D of this report. Quality Control samples, trip blanks, field blanks, and duplicates were collected and submitted for analyses according to the protocols outlined in the QA/QC document referenced above.

All groundwater samples collected during both rounds of groundwater sampling were submitted to the BCM Laboratory in Norristown, Pennsylvania, for analysis.

4.0 RESULTS OF INVESTIGATION

4.1 SOIL SAMPLE ANALYTICAL RESULTS

A total of 24 discrete soil samples were collected during the period from August 1 through 18, 1989. In addition, two duplicate soil samples, four field blank samples, and three trip blank samples were collected and submitted for laboratory analyses. All samples were analyzed for purgeable halocarbon volatile organic compounds (VOCs) by gas chromatography (GC). Laboratory analytical results for all compounds detected at or above their respective analytical method detection limits are summarized in Table 4. All quality control trip blank and field blank analytical results are summarized in Table 5. Laboratory analytical data sheets are contained in Appendix E.

VOCs detected in soil samples collected at Bishop Tube included the following:

- Bromodichloromethane
- Chloroform
- 1,1-Dichloroethane
- 1,2-Dichloroethane
- trans-1,2-Dichloroethene
- Tetrachloroethene (PCE)
- 1,1,1-Trichloroethane (TCA)
- Trichloroethene (TCE)

Methylene chloride, detected in many of the soil samples, was also detected in field blank and trip blank samples. Methylene chloride is a common laboratory contaminant and does not appear to be attributable to onsite soil conditions. Total VOC concentrations detected in the soil samples ranged from below the method detection limit in samples MW-10A (1.5) and MW-12 (1.5) to a high of greater than 85.5 milligrams per kilogram (mg/kg) in soil sample B-5 (3.5).

It should be noted that the VOC levels in the six samples from borings B-5 and B-6 were unable to be quantified by the laboratory and were reported at levels greater than the maximum instrument detection limit for each of the analyses. Reanalysis of the samples was attempted; however, the results of the reanalysis were anomalously low, suggesting that most of the VOC contaminants in the sample had volatilized out of the soil sample prior to the reanalysis. A description of the procedures utilized by the laboratory to analyze these samples is provided in a BCM interoffice correspondence contained in Appendix F.

4.2 GROUNDWATER SAMPLE ANALYTICAL RESULTS

The groundwater sampling program conducted at Bishop Tube consisted of two separate rounds of monitoring well sampling. The first round of groundwater sampling was conducted on August 29 and 30, 1989, and included collecting samples from monitoring wells MW-1 through MW-16. The second round of groundwater sampling was conducted on September 28, 1989, and included obtaining samples from monitoring wells MW-2 and MW-3 and MW-10 through MW-16.

All groundwater samples obtained in the first round in August were analyzed for pH and specific conductance. Groundwater samples collected from wells MW-1 through MW-9 were also analyzed for fluoride, nitrate, chromium, copper, and nickel to satisfy the quarterly groundwater monitoring requirements in the NPDES-permitted cooling water discharge area at the east end of the plant. All groundwater samples and QA/QC samples were analyzed for VOCs. Laboratory analytical results for all compounds detected at or above their respective analytical method detection limits are presented in the following tables: August 29 and 30 groundwater samples in Table 6, August 29 and 30 QA/QC samples in Table 7, September 28 groundwater samples in Table 8, and September 28 QA/QC samples in Table 9.

Where applicable, the Maximum Contaminant Levels (MCLs) established by the U.S. Environmental Protection Agency (EPA) for the respective contaminants in drinking water are listed on the tables. All laboratory analytical data sheets are presented in Appendix E.

4.2.1 August 29 and 30, 1989, Sample Analytical Results

VOCs detected in the groundwater samples collected on August 29 and 30 included the following:

- Chloroethane
- 1,1 Dichloroethane
- 1,2 Dichloroethane
- 1,1 Dichloroethene
- Methylene Chloride
- Tetrachloroethene (PCE)
- trans-1,2-Dichloroethene
- 1,1,1-Trichloroethane (TCA)
- Trichloroethene (TCE)
- Vinyl Chloride

Total VOC concentrations ranged from not detected above the method detection limit of 1 microgram per liter (ug/l) in background monitoring well MW-1 to a high of 202,607 ug/l in well MW-3. Each well in which VOC compounds were detected contained one or more VOC compounds at levels above the MCLs established for the respective VOC in drinking water. No VOCs were detected in the QA/QC blanks.

Fluoride concentrations ranged from less than 0.1 mg/l in MW-1 to a high of 14.1 mg/l in MW-4. Fluoride was above its MCL of 4.0 mg/l in monitoring wells MW-4, MW-5, MW-6, and MW-7.

Nitrate concentrations ranged from a low of 0.099 mg/l in MW-5 to a high of 7.13 mg/l in MW-4. Nitrate was not detected above its MCL of 10 mg/l in any of the wells.

The low (more acidic) pH of 5.83 standard units (S.U.) was detected in sample MW-7 and the high (more basic) pH of 7.34 S.U. was detected in sample MW-13. A secondary MCL has been established for pH and ranges from 6.5-8.5. pH was below (more acidic) the secondary MCL in monitoring wells MW-1, MW-4, and MW-7.

Specific conductance ranged from 95 micromhos (umhos) in MW-1 to 4,600 umhos in MW-5. No MCL has been established for specific conductance in drinking water.

Chromium levels ranged from below the method detection limit of 0.01 mg/l to 0.220 mg/l in sample MW-7. The MCL for chromium in drinking water is 0.05 mg/l and was exceeded in monitoring well MW-7.

Copper levels ranged from below the method detection limits of 0.02 mg/l to a high of 0.035 mg/l in sample MW-1. Copper has a secondary MCL of 1.0 mg/l which was not exceeded in any of the samples.

Nickel levels ranged from below the method detection limits of 0.04 mg/l to a high of 0.269 mg/l in MW-4. An MCL has not been established for nickel in drinking water.

4.2.2 September 28, 1989, Sample Analytical Results

The VOCs detected in the groundwater samples collected on September 28 were the same as those detected in the August 29 and 30 samples with the exceptions that 1,2-dichloroethane was not detected in the September samples, and chloroform, undetected in the August samples, was detected in the September analyses. Total VOC concentrations ranged from a low of 348 ug/l in sample MW-10A to a high of 684,890 ug/l in sample MW-3. Selected VOCs were detected in all the samples at levels above their respective MCLs. TCE and methylene chloride were detected in all field QA/QC samples.

4.3 HYDROGEOLOGIC ANALYSIS

The results of the groundwater investigation indicate that two aquifers are present at the site and have both been impacted by VOC contamination. The shallow aquifer occurs in the unconsolidated soil and saprolite unit and a deeper aquifer occurs in the Conestoga Limestone. A summary of the monitoring well construction details and the monitored aquifers is presented in Table 10.

Water table elevation measurements were obtained prior to each ground-water sampling event. A summary of the measured groundwater elevations is presented in Table 11. Groundwater flow in both aquifers is to the north-northeast and is shown in Figures 5 and 6. The lateral gradients are approximately 0.15 ft/ft in the area of the highest levels of groundwater contamination.

The shallow and deep aquifers are evidenced by the difference in elevation of the water table observed at well clusters at the site. Wells monitoring shallow groundwater at each cluster generally have higher water table elevations than wells monitoring groundwater occurrence in the bedrock aquifer at each cluster. The elevation difference between the two aquifers indicates that the aquifers are not in equilibrium.

The vertical hydraulic gradients were determined at well cluster locations where wells exist that monitor the two different aquifers. An analysis of vertical gradients is summarized in Table 12. The results of this determination indicate that a downward vertical gradient exists at three of the four well cluster locations. Well cluster MW-15/MW-16 indicated an upward vertical gradient.

The upward vertical gradient at well cluster MW-15/MW-16 may be resulting from the void encountered in MW-15 during drilling. The void maybe connected to areas hydraulically upgradient of the well and the water levels being measured in the well may be representative of hydraulic conditions in the upgradient areas.

Well cluster MW-13/MW-14, located hydraulically downgradient of the site, and approximately 250 feet west of well cluster MW-15/MW-16, had a downward hydraulic gradient. The discrepancy between the vertical hydraulic gradients prevents a determination of groundwater gradients in the off-site area. This discrepancy also emphasizes the heterogeneities present in the fractured and solution channel-bearing limestone aquifer.

5.0 DISCUSSION OF RESULTS

The results of the soil and groundwater investigation indicate that elevated levels of VOCs are present in onsite soils and in onsite and off-site groundwater.

5.1 SOIL SAMPLING RESULTS

~~The soil sample analytical results indicate that VOC contamination is present in nearly all soils at the site.~~ Generally, the detected levels of VOC contamination increased with increasing depth, suggesting that VOCs may have migrated upward into the soils after volatilizing from VOC contaminated groundwater.

The highest levels of VOCs detected in soils by headspace and laboratory analyses were in Borings B-5, B-6, B-10, B-11, and B-12. Borings B-5 and B-6 were drilled adjacent to the aboveground solvent storage tank. The locations of these soil borings were selected based on the results of the soil vapor survey (SVS) that was conducted in this area in October 1988. The soil sample analyses support the findings of the SVS which identified the tank as a potential source for the VOC contamination in soil and groundwater.

Borings B-10, B-11, and B-12 were drilled in the vicinity of the degreaser inside the building. Samples B-11 (6.5) and B-12 (4.5) contained the highest levels of total VOCs detected in soil in this study (3,367 and 157 mg/kg, respectively). These soil sample analytical results indicate that the degreaser tank is a likely source of VOC contamination in groundwater and soil at this site.

5.2 GROUNDWATER SAMPLING RESULTS

The groundwater sample analytical results indicate the presence of VOCs in groundwater in all wells except the background well (MW-1). Specific VOCs were detected in all wells at levels above their respective MCLs. The downgradient extent and the vertical extent of the contaminant plume have not been determined. ~~The VOC contaminant plume appears to trend to the northeast and originates from the aboveground solvent storage tank and degreaser tank areas.~~ The VOC contaminant plume is shown in Figures 7 and 8 for the August 29 and 30 and the September 28 sampling events, respectively.

The VOC plume appears to be oriented slightly to the east of the groundwater flow direction which is to the north northeast. The difference between groundwater flow direction and contaminant distribution may be the result of heterogeneities in the Conestoga

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Limestone aquifer. The Conestoga Limestone aquifer has numerous dissolution channels and fractures which act as the primary conduits for groundwater flow in the aquifer. The orientation of these conduits in the rock strata will effect the groundwater and contaminant flow direction.

The most prevalent VOCs detected in groundwater were TCE and TCA and their degradation products. TCE was consistently the VOC detected at the highest levels in the well samples followed in concentration by TCA and trans-1,2-dichloroethene. TCE and TCA are both heavier than water and will tend to sink in the aquifer when released as product. Trans-1,2-dichloroethene is slightly lighter than water and will tend to float on water when released as product. TCE, TCA, and trans-1, 2-dichloroethene have relatively low solubilities ranging from approximately 0.1 percent (TCE) to 0.63 percent (trans-1,2-dichloroethene).

The highest levels of VOCs detected in groundwater in both aquifers in both sampling events were at the well cluster MW-2/MW-3 which is located adjacent to the aboveground solvent storage tank. Monitoring well MW-2 monitors the uppermost portion of the Conestoga Limestone aquifer and monitoring well MW-3 monitors the unconsolidated aquifer above it. The results of both sampling rounds indicated that the shallow aquifer contains significantly higher levels of VOCs than the deeper limestone aquifer. Three other well clusters are situated in the vicinity of the plant and are at greater distances from the potential source area. Sample analytical results from well clusters MW-15/MW-16 and MW-8/MW-9 determined that the deep wells monitoring the rock aquifer have higher levels of VOCs than the shallow wells monitoring the unconsolidated aquifer. These results are consistent with the concept that the contaminants have migrated into the deeper rock aquifer and impacted the downgradient well clusters MW-15/MW-16 and MW-8/MW-9.

The well cluster MW-13/MW-14 showed inconsistent results between the two sampling rounds. The deep well (MW-13) monitoring the rock aquifer contained higher levels of total VOCs than the shallow well (MW-14) monitoring the unconsolidated aquifer in the August sampling. Lower levels of total VOCs were detected in the deep well than in the shallow well in the September sampling. These results suggest that the samples may have been mislabeled. The VOC levels in these wells will be confirmed by sampling and analyses to be conducted in subsequent phases of the investigation.

The results of the quarterly monitoring of groundwater wells in the vicinity of the NPDES-permitted cooling water discharge area detected fluoride and chromium at levels above their respective MCLs in selected wells. Continued quarterly monitoring of these wells will determine if the levels of these contaminants will decrease with time as expected by the repair of the sump in the shop, the suspected source area for these contaminants in groundwater.

The secondary MCL for pH was exceeded in MW-1, MW-4, and MW-7. MW-1 is situated hydraulically upgradient of the site and monitors the rock aquifer. MW-1 contained the lowest pH measurement which indicates that groundwater in the Wissahickon Formation may be naturally more acidic than groundwater in the Conestoga Formation.

5.3 HYDROGEOLOGY

The information obtained from the hydrogeologic investigation indicates that contaminated groundwater is apparently migrating from the above-ground solvent storage tank and degreaser tank areas towards the northeast. The analysis of vertical hydraulic gradients indicates that a downward vertical hydraulic gradient exists in the vicinity of the source areas at the plant. This analysis concurs with the groundwater analytical results from the offsite well clusters which document the presence of higher levels of VOCs in the Conestoga Limestone aquifer than in the unconsolidated aquifer. This analysis further indicates that contamination appears to be entering the limestone aquifer in the vicinity of the source areas and is migrating to the northeast through the rock aquifer. Lower levels of VOC contamination exist in the shallow aquifer and are migrating offsite to the northeast.

The release of TCE or TCA solvent product into the aquifer may have resulted in the occurrence of a discrete body of solvent product in the aquifer. These solvents are more dense than water and have relatively low solubilities, which will cause the body of solvent to migrate downward in the aquifer as it solubilizes. The primary control over flow in the limestone aquifer is the occurrence of solution channels and fractures; therefore, the rate of migration of the solvent product (dense non-aqueous phase liquid or DNAPL) or the dissolved solvent in groundwater will be primarily controlled by the occurrence and interconnection of fractures and solution channels in the vicinity of the source areas. No estimates on the rate of migration of the contaminant plume can be developed without conducting aquifer testing.

6.0 CONCLUSIONS

The results of the Phase I investigation determined that VOCs are present in groundwater at levels above their respective MCLs for drinking water. A VOC contaminant plume exists in the groundwater extending to the northeast from the plant. The apparent sources of the VOC contaminant plume are the aboveground solvent storage tank and the degreaser tank. VOC contamination exists in both the shallow unconsolidated soil aquifer and the deeper (Conestoga Formation) aquifer. The depth and downgradient extent of the contamination in the aquifer can not be determined without additional aquifer characterization.

Soil sample analytical results indicate the presence of VOCs in soil in the vicinity of the aboveground solvent storage tank and the degreaser. In general, the highest levels of soil contamination are found at depth near the groundwater surface indicating that the volatilized VOCs may have migrated upward into the soil from contaminated groundwater. The highest levels of VOC contamination in soils was observed in borings drilled adjacent to the aboveground solvent storage tank and degreaser tank.

Fluoride and chromium were detected above their respective MCLs in groundwater in the vicinity of the NPDES-permitted cooling water discharge location. Continued quarterly monitoring of groundwater quality in this area will enable an evaluation of the effectiveness of repairing the sump, the suspected source of the fluoride contamination in groundwater.

7.0 RECOMMENDATIONS

BCM recommends that additional investigations be conducted and that Phase II - Aquifer Testing be implemented to enable Christiana to proceed with remediation of onsite VOC contamination in groundwater. The additional investigations should include the following:

- Conducting a tracer test on the solvent handling areas to characterize the integrity of the solvent handling apparatus (i.e. storage tank, piping, and degreaser tank)
- Conducting a well records search in the vicinity of the site to identify potential groundwater users and downgradient water quality
- Implementing a drilling and sampling investigation to delineate downgradient (offsite) and vertical extent of VOC contamination in the aquifer.
- Incorporating the results of the above tasks into an investigation of possible risk-based cleanup levels applicable to this site

BCM recommends that Christiana proceed with Phase II: Aquifer Testing of the June 1989 Groundwater Remediation Work Plan to expedite remediation of the highest levels of VOC contamination detected in onsite groundwater concurrent with the additional investigations defined above.

8.0 REFERENCES

- BCM Engineers Inc., 1989. Christiana Metals Corporation, Bishop Tube Facility, Frazer, Pennsylvania, Groundwater Remediation Work Plan. June.
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TABLES



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TABLES

TABLE 1
SUMMARY OF OVA SOIL SAMPLE HEAD SPACE ANALYSES*

CHRISTIANA METALS CORPORATION
BISHOP TUBE FACILITY
FRAZER, PENNSYLVANIA

Sample I.D.**		Reading (PPM)***
MW-10	(0-2)	140
	(2-4)	30
B-5	(0-2)	90
	(2-4)	>1000
	(4-6)	>1000
	(6-8)	300
B-6	(0-2)	600
	(2-4)	---
	(4-6)	120
B-7	(0-2)	1
	(4-6)	8
	(10-12)	60
B-8 and MW-11	(0-2)	NIR
	(4-6)	NIR
	(8-10)	2
	(12-14)	NIR
	(14-16)	NIR
	(16-17.5)	NIR
MW-12	(0-2)	NIR
	(2-4)	NIR
	(4-6)	NIR
	(6-8)	NIR
	(8-10)	NIR
	(12-14)	NIR
	(14-16)	NIR
	(16-18)	NIR
	(18-20)	NIR

TABLE 1 (Continued)

Sample I.D.**		Reading (PPM)***
B-9	(0-2)	2
	(6-8)	1
	(10-12)	300
	(12-14)	20
	(20-22)	2
MW-14	(5-7)	NIR
	(10-12)	NIR
B-10	(0-2)	10
	(3-5)	8
	(5-7)	6
	(9-11)	NIR
	(11-13)	NIR
	(13-15)	NIR
B-11	(0-2)	250
	(3-5)	>1000
	(5-7)	>1000
	(9-11)	160
	(13-15)	>1000
	(15-17)	>1000
B-12	(3-5)	>1000
	(5-7)	>1000
	(7-9)	45

Notes:

- * = Summarized from Field Log Book
- ** = Boring Number (depth of sample in feet)
- *** = All readings obtained using portable flame ionization vapor analyzer
- NIR = No Instrument Response

Source: BCM Engineers Inc. (BCM Project No. 00-6471-01)



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TABLE 2
SUMMARY OF SOIL BORING AND STREAM BED ELEVATIONS
CHRISTIANA METALS CORPORATION
BISHOP TUBE FACILITY
FRAZER, PENNSYLVANIA

Boring/Stream Location	Elevation (in feet, referenced to NGVD 1929)
B-5	384.48
B-6	384.35
B-7	384.05
B-9	383.07
Stream 1	358.50
Stream 2	368.90
Stream 3	378.20

Source: BCM Engineers Inc. (BCM Project No. 00-6471-01).

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TABLE 3

SUMMARY OF MONITORING WELL ELEVATION SURVEY *

CHRISTIANA METALS CORPORATION
BISHOP TUBE FACILITY
FRAZER, PENNSYLVANIA

Well No.	Elevation (feet) ^a		
	Ground	Top Inner Casing	Top Outer Casing
MW-1	423.86	424.21	424.66
MW-2	384.00	384.37	384.72
MW-3	383.94	384.66	385.04
MW-4	386.74	387.08	387.52
MW-5	387.24	387.89	388.45
MW-6	387.48	388.48	388.64
MW-7	396.96	398.69	399.20
MW-8	388.09	384.14	384.31
MW-9	382.81	NM ^b	384.10
MW-10	384.56	383.87	384.54
MW-11	384.00	383.42	384.03
MW-12	383.15	382.46	383.15
MW-13	373.45	374.83	375.21
MW-14	373.18	374.30	375.08
MW-15	367.94	369.68	370.07
MW-16	367.91	369.80	370.20

Notes:

NM = Not measured.

a. Elevations are references to the NGVD 1929.

b. MW-9 was not constructed with an inner casing. This well is an open rock well. Depth to water was measured from the top of the steel casing.

* Well Elevations Surveyed by James M. Stewart, Inc.

Source: BCM Engineers Inc. (BCM Project No. 00-6471-01)

TABLE 4

SUMMARY OF AUGUST 1989 SOIL SAMPLE ANALYTICAL RESULTS

CHRISTIANA METALS CORPORATION
BISHOP TUBE FACILITY
FRAZER, PENNSYLVANIA

Sampling Location:		MW-10A ^a	B-5 ^a	B-5 ^a	B-5 ^a	B-5 ^a	B-6 ^a	B-6 ^a
Sample Depth:		1.5	1.5	3.5	4.5	6.5	1.5	5.5
Sampling Date:		08/01/89	08/01/89	08/01/89	08/01/89	08/01/89	08/01/89	08/01/89
BCM Sample Number:	Units	923863	923864	923865	923866	923867	923868	923869
<u>Volatile Organic Compounds (VOCs)</u>								
Bromodichloromethane	mg/kg	<0.0114	<0.0141	>4.0	>0.1	>0.5	<0.115	<0.118
1,1-Dichloroethane	mg/kg	<0.0114	<0.0141	>1.0	>1.0	>1.0	>3.0	>0.7
1,2-Dichloroethane	mg/kg	<0.0114	<0.0141	<0.116	>0.116	<0.116	<0.115	<0.118
1,1-Dichloroethene	mg/kg	<0.0114	>0.2	>20	>20	>3.0	>10	>10
Methylene Chloride	mg/kg	<0.0114	<0.0141	>0.5 ^b	>1.0 ^b	>0.1 ^b	>0.2 ^b	>0.1 ^b
1,1,1-Trichloroethane	mg/kg	<0.0114	>0.0141	>40	>50	>4.0	>5.0	>5.0
Trichloroethene (TCE)	mg/kg	<0.0114	>2.0	>20	>10	>8.0	>10	>10
Total VOCs	mg/kg	ND	>2.2	>85.5	>82.2	>16.7	>28.2	>25.8

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TABLE 4 (Continued)

Sampling Location:		MW-11	MW-11	B-7	B-7	B-7(Dup)	B-7
Sample Depth:		1.5	9.5	1.5	10.5	10.5A	13.0
Sampling Date:		08/02/89	08/02/89	08/02/89	08/02/89	08/02/89	08/02/89
BCM Sample Number:	Units	924150	924151	924152	924153	924154	924155

Volatile Organic Compounds (VOCs)

Chloroform	mg/kg	<0.0116	<0.0117	<0.0116	<0.0119	<0.0117	0.582
1,1-Dichloroethene	mg/kg	<0.0116	<0.0117	<0.0116	0.0705	0.0420	0.0481
Methylene Chloride	mg/kg	0.0301 ^C	0.0281 ^C	0.0337 ^C	0.0311 ^C	0.0350 ^C	<0.0134
1,1,1-Trichloroethane	mg/kg	<0.0116	<0.0117	<0.0116	<0.0119	<0.0117	0.728
Trichloroethene (TCE)	mg/kg	<0.0116	0.0223	<0.0116	<0.0119	0.219	0.781
Total VOCs		0.0301	0.0504	0.0337	0.1016	0.2960	2.139

TABLE 4 (Continued)

Sampling Location:		MW-12	MW-12	MW-12	B-9	B-9	B-9(Dup)	B-9
Sample Depth:		1.5	7.5	15.0	1.5	7.5	7.5A	10.5
Sampling Date:		08/03/89	08/03/89	08/03/89	08/03/89	08/03/89	08/03/89	08/03/89
BCM Sample Number:	Units	924156	924157	924158	924159	924160	924161	924162
<u>Volatile Organic Compounds (VOCs)</u>								
Chloroform	mg/kg	<0.0115	<0.0124	0.0237	<0.0118	<0.0117	<0.0115	0.0763
Methylene Chloride	mg/kg	<0.0115	<0.0124	<0.0158	<0.0118	<0.0117	<0.0115	0.0157 ^c
trans-1,2-Dichloroethene	mg/kg	<0.0115	<0.0124	<0.0158	0.0662	0.0653	0.229	0.0182
1,1,1-Trichloroethane	mg/kg	<0.0115	<0.0124	0.117	<0.0118	<0.0117	<0.0115	<0.0121
Trichloroethene (TCE)	mg/kg	<0.0115	0.0136	0.758	0.0225	<0.0117	0.0311	0.0702
Total VOCs		ND	0.0136	0.8987	0.0887	0.0653	0.2601	0.1804

TABLE 4 (Continued)

Sampling Location:		B-10	B-10	B-11	B-11	B-12	B-12
Sample Depth:		1.5	6.5	1.5	6.5	4.5	6.5
Sampling Date:		08/18/89	08/18/89	08/18/89	08/18/89	08/18/89	08/18/89
BCM Sample Number:	Units	926125	926126	926127	926128	926129	926130
<u>Volatile Organic Compounds (VOCs)</u>							
1,1-Dichloroethene	mg/kg	<0.0117	<0.0116	<0.0119	39.0	<1.15	<0.0605
Methylene Chloride	mg/kg	<0.0117	<0.0116	<0.0119	1.44	<1.15	0.357
Tetrachloroethene (PCE)	mg/kg	<0.0117	<0.0116	<0.0119	10.2	<1.15	<0.0605
1,1,1-Trichloroethane	mg/kg	<0.0117	<0.0116	<0.0119	36.0	<1.15	<0.0605
Trichloroethene (TCE)	mg/kg	1.03	<0.0116	0.0226	3280	157	6.99
Total VOCs		1.03	<0.0116	0.0226	3367	157	7.347

Notes:

ND = None detected.

- Peak areas for these samples were outside of the calibration curve, consequently, a quantitative value could not be determined (see Appendix F).
- Compound also detected in the field blank dated 08/01/89.
- Compound also detected in the trip blank dated 08/01/89.
This trip blank is associated with the 08/02/89 samples.

Source: BCM Engineers Inc. (BCM Project No. 00-6471-01)

TABLE 5
SUMMARY OF SOIL QA/QC SAMPLE ANALYTICAL RESULTS
CHRISTIANA METALS CORPORATION
BISHOP TUBE FACILITY
FRAZER, PENNSYLVANIA

Sample ID: Sampling Date: BCM Sample Number:		Trip Blank 07/31/89 923870	Field Blank 08/01/89 923871	Trip Blank 08/01/89 924163	Field Blank 08/02/89 924164	Field Blank 08/03/89 924165	Trip Blank 08/17/89 926131	Field Blank 08/17/89 926132
	Units							
<u>Volatile Organic Compounds (VOCs)^a</u>								
Methylene chloride	ug/l	<1.0	5.6	2.1	<1.0	<1.0	<1.0	<1.0

Notes:

a. With the exception of methylene chloride, no other VOCs were detected in these samples.

Source: BCM Engineers Inc. (BCM Project No. 00-6471-01)

10-11-89
7/2/89

TABLE 6
SUMMARY OF AUGUST 29 AND 30, 1989 GROUNDWATER SAMPLE ANALYTICAL RESULTS

CHRISTIANA METALS CORPORATION
BISHOP TUBE FACILITY
FRAZER, PENNSYLVANIA

Sampling Location: Sample ID: Sampling Date: BCM Sample Number:	Units	USEPA MCL	MW-1 Unfiltered 08/29/89 927566	MW-1 Filtered 08/29/89 927571	MW-2 Unfiltered 08/30/89 927720	MW-3 Unfiltered 08/30/89 927721	MW-4 Unfiltered 08/29/89 927567	MW-4 Filtered 08/29/89 927572
<u>Volatile Organic Compounds (VOCs)</u>								
1,1-Dichloroethane	ug/l	NL	<1.0	NT	157	14.0	11.2	NT
1,2-Dichloroethane	ug/l	5.0	<1.0	NT	1,050 *	<10.0	<1.0	NT
1,1-Dichloroethene	ug/l	7.0	<1.0	NT	611 *	103 *	5.5	NT
Methylene Chloride	ug/l	NL	<1.0	NT	10.9	<10.0	<1.0	NT
Tetrachloroethene (PCE)	ug/l	NL	<1.0	NT	85.6	124	24.9	NT
trans-1,2-Dichloroethene	ug/l	NL	<1.0	NT	685	236	316	NT
1,1,1-Trichloroethane	ug/l	200	<1.0	NT	17,300 *	3,130 *	18.9	NT
Trichloroethene (TCE)	ug/l	5.0	<1.0	NT	36,100 *	199,000 *	1110 *	NT
Vinyl Chloride	ug/l	2.0	<1.0	NT	<10.0	<10.0	42.2 *	NT
Total VOCs ^d		NL	ND	NT	56,000	202,607	1,529	NT
<u>Inorganic and Physical Parameters</u>								
Fluoride	mg/l	2.0-4.0 ^a	<0.1	NT	NT	NT	14.1 *	NT
Nitrate	mg/l	10.0	0.789	NT	NT	NT	7.13	NT
pH-field	Std. Units	6.5-8.5 ^b	5.93 *	NT	NT	NT	6.28 *	NT
Specific Conductance	umhos	NL	95	NT	NT	NT	500	NT
<u>Metals</u>								
Chromium	mg/l	0.05	NT	<0.01	NT	NT	NT	0.011
Copper	mg/l	1.0 ^b	NT	0.035	NT	NT	NT	0.027
Nickel	mg/l	NL	NT	<0.04	NT	NT	NT	0.269

TABLE 6 (Continued)

Sampling Location: Sample ID: Sampling Date: BCM Sample Number:	Units	USEPA MCL	MW-5 Unfiltered 08/29/89 927568	MW-5 Filtered 08/29/89 927573	MW-6 Unfiltered 08/29/89 927569	MW-6 Filtered 08/29/89 927574	MW-7 Unfiltered 08/29/89 927570	MW-7 Filtered 08/29/89 927575
<u>Volatile Organic Compounds (VOCs)</u>								
Chloroethane	ug/l	NL	3.3	NT	<1.0	NT	<1.0	NT
1,1-Dichloroethane	ug/l	NL	16.6	NT	9.9	NT	1.3	NT
1,1-Dichloroethene	ug/l	7.0	<1.0	NT	6.5	NT	<1.0	NT
Tetrachloroethene (PCE)	ug/l	NL	<1.0	NT	<1.0	NT	<1.0	NT
trans-1,2-Dichloroethene	ug/l	NL	18.5	NT	82.4	NT	49.3	NT
1,1,1-Trichloroethane	ug/l	200	<1.0	NT	70.1	NT	2.5	NT
Trichloroethene (TCE)	ug/l	5.0	<1.0	NT	526 *	NT	78.9 *	NT
Vinyl Chloride	ug/l	2.0	4.2 *	NT	8.7 *	NT	<1.0	NT
Total VOCs ^d	ug/l	NL	42.6	NT	704	NT	132	NT
<u>Inorganic and Physical Parameters</u>								
Fluoride	mg/l	2.0-4.0 ^a	9.56 *	NT	8.02 *	NT	5.66 *	NT
Nitrate	mg/l	10.0	0.099	NT	1.67	NT	2.21	NT
pH-field	Std. Units	6.5-8.5 ^b	6.62	NT	6.58	NT	5.83 *	NT
Specific Conductance	umhos	NL	4,600	NT	710	NT	250	NT
<u>Metals</u>								
Chromium	mg/l	0.05	NT	<0.01	NT	0.01	NT	0.220*
Copper	mg/l	1.0 ^b	NT	0.022	NT	0.021	NT	<0.02
Nickel	mg/l	NL	NT	0.090	NT	<0.04	NT	0.251

TABLE 6 (Continued)

Sampling Location:			MW-8	MW-8	MW-8A ^C	MW-8A ^C	MW-9	MW-9
Sample ID:			Unfiltered	Filtered	Unfiltered	Filtered	Unfiltered	Filtered
Sampling Date:			08/29/89	08/29/89	08/29/89	08/29/89	08/29/89	08/29/89
BCM Sample Number:	Units	USEPA MCL	927714	927717	927715	927718	927716	927719
<u>Volatile Organic Compounds (VOCs)</u>								
Chloroethane	ug/l	NL	16.6	NT	<1.0	NT	<1.0	NT
1,1-Dichloroethane	ug/l	NL	3.2	NT	2.8	NT	20.6	NT
1,1-Dichloroethene	ug/l	7.0	37.7 *	NT	<1.0	NT	63.3 *	NT
Methylene Chloride	ug/l	NL	1.6	NT	1.1	NT	2.4	NT
Tetrachloroethene (PCE)	ug/l	NL	9.3	NT	9.2	NT	14.9	NT
trans-1,2-Dichloroethene	ug/l	NL	803	NT	798	NT	482	NT
1,1,1-Trichloroethane	ug/l	200	399 *	NT	395 *	NT	621 *	NT
Trichloroethene (TCE)	ug/l	5.0	2,860 *	NT	2,750 *	NT	4,130 *	NT
Vinyl Chloride	ug/l	2.0	86.8 *	NT	60.8 *	NT	14.4	NT
Total VOCs ^d	ug/l	NL	4,217	NT	4,008	NT	5,349	NT
<u>Inorganic and Physical Parameters</u>								
Fluoride	mg/l	2.0-4.0 ^a	1.11	NT	1.02	NT	2.57	NT
Nitrate	mg/l	10.0	0.327	NT	0.121	NT	0.106	NT
pH-field	Std. Units	6.5-8.5 ^b	6.91	NT	6.91	NT	6.98	NT
Specific Conductance	umhos	NL	440	NT	440	NT	450	NT
<u>Metals</u>								
Chromium	mg/l	0.05	NT	0.012	NT	<0.01	NT	<0.01
Copper	mg/l	1.0 ^b	NT	<0.02	NT	<0.02	NT	<0.02
Nickel	mg/l	NL	NT	<0.04	NT	<0.04	NT	<0.04

TABLE 6 (Continued)

Sampling Location: Sample ID: Sampling Date: BCM Sample Number:	Units	USEPA MCL	MW-10 Unfiltered 08/30/89 927722	MW-11 Unfiltered 08/30/89 927723	MW-12 Unfiltered 08/30/89 927724	MW-13 Unfiltered 08/30/89 927576	MW-14A Unfiltered 08/29/89 927577	MW-14B ^c Unfiltered 08/29/89 927578	MW-15 Unfiltered 08/29/89 927579	MW-16 Unfiltered 08/29/89 927580
<u>Volatile Organic Compounds (VOCs)</u>										
Chloroethane	ug/l	NL	<1.0	<10.0	<10.0	<1.0	<1.0	<1.0	<1.0	18.6
1,1-Dichloroethane	ug/l	NL	1.4	900	12.8	33.6	8.9	7.3	53.8	419
1,2-Dichloroethane	ug/l	5.0	<1.0	103 *	<10.0	<1.0	<1.0	<1.0	<1.0	41.8 *
1,1-Dichloroethene	ug/l	7.0	<1.0	600 *	<1.0	<10.0	16.6 *	13.2 *	564 *	140 *
Methylene Chloride	ug/l	NL	<1.0	15.0	14.8	<1.0	<1.0	<1.0	1.8	<1.0
Tetrachloroethene (PCE)	ug/l	NL	<1.0	32.1	14.7	23.5	<1.0	<1.0	39.3	7.4
trans-1,2-Dichloroethene	ug/l	NL	4.6	1,970	85.9	110	12.5	10.6	570	169
1,1,1-Trichloroethane	ug/l	200	84.2	20,700 *	540 *	3,470 *	287 *	323 *	7,800 *	2,340 *
Trichloroethene (TCE)	ug/l	5.0	93.8 *	17,100 *	3,940 *	10,600 *	666 *	751 *	44,400 *	4,580 *
Vinyl Chloride	ug/l	2.0	<1.0	<10.0	<10.0	<1.0	<1.0	<1.0	<1.0	<1.0
Total VOCs ^d	ug/l	NL	184	41,420	4,608	14,401	991	1,105	53,429	7,716
<u>Physical Parameters</u>										
pH-field	Std.Units	6.5-8.5 ^b	NT	NT	NT	7.34	6.95	6.95	7.13	7.18
Specific Conductance	umhos	NL	NT	NT	NT	380	430	430	610	380

Notes:

USEPA MCL = United States Environmental Protection Agency Maximum Contaminant Level.

ND = None detected.

NL = No USEPA MCL is listed.

NT = Not tested as part of this study.

* = Compound detected above USEPA MCL.

a. The MCL for fluoride ranges from 2 mg/l, the secondary MCL, to 4 mg/l.

This range of values depends on the average air temperature of the region.

b. This value is a secondary MCL.

c. Sample is a duplicate of the previous sample.

d. Total VOC values are rounded as appropriate.

Source: BCM Engineers Inc. (BCM Project No. 00-6471-01)

ORIGINAL
(11-1)

BCM

TABLE 7

SUMMARY OF AUGUST 29 AND 30, 1989, GROUNDWATER QA/QC SAMPLE ANALYTICAL RESULTS

CHRISTIANA METALS CORPORATION
BISHOP TUBE FACILITY
FRAZER, PENNSYLVANIA

Sample ID:		Trip Blank	Field Blank	Trip Blank	Field Blank
Sampling Date:		08/29/89	08/29/89	08/30/89	08/30/89
BCM Sample Number:	Units	927581	927582	927725	927726
Volatile Organic Compounds		ND	ND	ND	ND

Notes:

ND = No compounds detected.

Source: BCM Engineers Inc. (BCM Project No. 00-6471-01)

TABLE 8

SUMMARY OF SEPTEMBER 28, 1989, GROUNDWATER SAMPLE ANALYTICAL RESULTS

CHRISTIANA METALS CORPORATION
BISHOP TUBE FACILITY
FRAZER, PENNSYLVANIA

Sampling Location:			MW-2	MW-3	MW-10A	MW-10B ^a
Sampling Date:		USEPA	09/28/89	09/28/89	09/28/89	09/28/89
BCM Sample Number:	Units	MCL	930389	930390	930391	930392
<u>Volatile Organic Compounds (VOCs)</u>						
1,1-Dichloroethane	ug/l	NL	157	<1,000	4.3	6.3
1,1-Dichloroethene	ug/l	7.0	1,190 *	<1,000	2.6	4.9
Methylene Chloride ^b	ug/l	NL	152	2,160	2.8	<1.0
Tetrachloroethene (PCE)	ug/l	NL	102	<1,000	<1.0	1.0
trans-1,2-Dichloroethene	ug/l	NL	623	<1,000	9.9	14.2
1,1,1-Trichloroethane	ug/l	200	16,500 *	2,730 *	84.4	112
Trichloroethene (TCE) ^c	ug/l	5.0	48,900 *	680,000 *	244 *	227 *
Vinyl Chloride	ug/l	2.0	<100	<1,000	<1.0	1.5
Total VOCs ^d	ug/l	NL	67,624	684,890	348	367

TABLE 8 (Continued)

Sampling Location: Sampling Date: BCM Sample Number:	Units	USEPA MCL	MW-11 09/28/89 930393	MW-12 09/28/89 930394	MW-13 09/28/89 930395	MW-14 09/28/89 930396	MW-15 09/28/89 930397	MW-16 09/28/89 930398
<u>Volatile Organic Compounds (VOCs)</u>								
Chloroethane	ug/l	NL	<100	<1.0	<10.0	<10.0	<1.0	5.7
Chloroform	ug/l	100	<100	<1.0	<10.0	<10.0	4.9	<1.0
1,1-Dichloroethane	ug/l	NL	711	12.0	<10.0	35.9	66.4	265
1,1-Dichloroethene	ug/l	7.0	884 *	53.1 *	22.6 *	229 *	789 *	103 *
Methylene Chloride ^b	ug/l	NL	237	<1.0	19.2	16.7	<1.0	<1.0
Tetrachloroethene (PCE)	ug/l	NL	<100	7.5	<10.0	31.3	97.6	3.0
trans-1,2-Dichloroethene	ug/l	NL	2,170	69.5	12.3	140	446	110
1,1,1-Trichloroethane	ug/l	200	19,600 *	425 *	490 *	3,930 *	10,100 *	1,320 *
Trichloroethene (TCE) ^c	ug/l	5.0	15,500 *	3,150 *	863 *	13,800 *	116,000 *	1,144 *
Vinyl chloride	ug/l	2.0	<100	15.6 *	<10.0	<10.0	<1.0	<1.0
Total VOCs ^d		NL	39,102	3,733	1,407	18,183	127,504	2,951

Notes:

USEPA MCL = United States Environmental Protection Agency Maximum Contaminant Level.

NL = No USEPA MCL is listed.

* = Compound detected above USEPA MCL.

a. MW-10B is a duplicate of MW-10A.

b. The method blank contained 2.8 ug/l of methylene chloride. This is equivalent to 28 ug/l, 280 ug/l, and 2800 ug/l in samples where the method detection limit was <10.0 ug/l, <100 ug/l, and <1,000 ug/l, respectively. Methylene chloride was also detected in the trip and field blanks at 1.2 ug/l.

c. TCE was detected in the trip and field blank at 12.7 and 3.5 ug/l, respectively.

d. Total VOC values are rounded off to at least three significant figures.

Source: BCM Engineers Inc. (BCM Project No. 00-6471-01)



TABLE 9

SUMMARY OF SEPTEMBER 28, 1989, GROUNDWATER QA/QC SAMPLE ANALYTICAL RESULTS

CHRISTIANA METALS CORPORATION
BISHOP TUBE FACILITY
FRAZER, PENNSYLVANIA

Sample ID:		Trip Blank	Field Blank
Sampling Date:		09/28/89	09/28/89
BCM Sample Number:	Units	930399	930400

Volatile Organic Compounds (VOCs)

Methylene chloride ^a	ug/l	1.2	1.2
Trichloroethene (TCE)	ug/l	12.7	3.5

Notes:

a. The method blank contained 2.4 ug/l of methylene chloride.

Source: BCM Engineers Inc. (BCM Project No. 00-6471-01)

BCM

ORIGINAL
(Red)

TABLE 10

SUMMARY OF MONITORING WELL CONSTRUCTION DETAILS
AND MONITORED AQUIFERS

CHRISTIANA METALS CORPORATION
BISHOP TUBE FACILITY
FRAZER, PENNSYLVANIA

Well Identification	Depth to base of Well*	Depth to Top of Rock*	Depth of Monitored Interval*	Elevation of Top of Rock (AMSL)	Monitored Aquifer
MW-1	48	---	28-48	---	Rock
MW-2	24	13	15-24	371.00	Rock
MW-3	13.5	13	8-13.5	370.94	Unconsolidated
MW-4	20	9	7-20	377.74	Rock
MW-5	20	---	10-20	---	Unconsolidated
MW-6	20.66	---	10.66-20.66	---	Unconsolidated
MW-7	19.8	---	9.8-19.8	---	Unconsolidated
MW-8	18	---	8-18	---	Unconsolidated
MW-9**	63	26	46-63	356.81	Rock
MW-10	15	4	5-15	380.56	Rock
MW-11	16	17	6-16	367.00	Unconsolidated
MW-12	21	20	8-21	363.15	Unconsolidated
MW-13	37	15	27-37	358.45	Rock
MW-14	15	15	5-15	358.18	Unconsolidated
MW-15	78	21	68-78	346.94	Rock
MW-16	21	17	7-21	350.91	Unconsolidated

Notes:

* = Feet below grade.

** = MW-9 is an open rock well.

AMSL = Above mean sea level.

Source: BCM Engineers Inc. (BCM Project No. 00-6471-01)

TABLE 11
SUMMARY OF GROUNDWATER ELEVATIONS

CHRISTIANA METALS CORPORATION
BISHOP TUBE FACILITY
FRAZER, PENNSYLVANIA

Well No.	Depth to Groundwater (feet) ^a		Groundwater Elevation(feet) ^b	
	8/29/89 & 8/30/89	9/28/89	8/29/89 & 8/30/89	9/28/89
MW-1	13.25	NM	410.96	NM
MW-2	6.35	7.77	378.02	376.60
MW-3	6.10	7.51	378.56	377.15
MW-4	10.71	NM	376.37	NM
MW-5	12.10	NM	375.79	NM
MW-6	16.22	NM	372.26	NM
MW-7	12.62	NM	386.07	NM
MW-8	13.73	NM	370.41	NM
MW-9	15.45	NM	368.65	NM
MW-10	2.52	2.79	381.35	381.08
MW-11	9.01	8.64	374.41	374.78
MW-12	8.63	10.11	373.83	372.35
MW-13	10.32	13.29	364.51	361.54
MW-14	9.12	8.45	365.18	365.68
MW-15	*	*	*	*
MW-16	7.18	5.55	362.62	364.25

Notes:

* = An accurate water level measurement not available because the water level is above the casing.

NM = Not measured.

a. Depth to water measured from the top of the inner well casing with electronic depth to water probes in all wells except MW-9 which is an open rock well and measurement was from top of protective steel casing.

b. Elevations are referenced to the NGVD 1929.

Source: BCM Engineers Inc. (BCM Project No. 00-6471-01)



VERTICAL FLOW GRADIENT COMPUTATIONS

	Well Depth (feet)	Depth to Center of Monitored Interval (feet)	Water Table Elevation (AMSL)	
			8/29/89 & 8/30/89	9/28/89
<u>CLUSTER MW-2/MW-3</u>				
MW-2	24	19.50	378.02	376.60
MW-3	13.5	<u>10.75</u>	<u>378.56</u>	<u>377.15</u>
Difference		8.75	-0.54	-0.55
Vertical Gradient 8/29/89 & 8/30/89:			-0.54/8.75 =	-0.0617
Vertical Gradient 9/28/89:			-0.55/8.75 =	-0.0628
<u>CLUSTER MW-8/MW-9</u>				
MW-9	63	54.5	368.65	NM
MW-8	18	<u>13</u>	<u>370.41</u>	NM
Difference		41.5	-1.76	
Vertical Gradient 8/29/89 & 8/30/89:			-1.76/41.5 =	-0.0424

TABLE 12 (Continued)

	Well Depth (feet)	Depth to Center of Monitored Interval (feet)	Water Table Elevation (AMSL)	
			8/29/89 & 8/30/89	9/28/89
<u>CLUSTER MW-13/MW-14</u>				
MW-13	37	32	364.51	361.54
MW-14	15	<u>10</u>	<u>365.18</u>	<u>365.68</u>
Difference		22	-0.67	-4.14
Vertical Gradient 8/29/89 & 8/30/89:			-0.67/22 =	-0.030
Vertical Gradient 9/28/89:			-4.14/22 =	-0.188
<u>CLUSTER MW-15/MW-16</u>				
MW-15*	78	73	369.68	369.68
MW-16	21	<u>14</u>	<u>362.62</u>	<u>364.25</u>
Difference		59	+7.06	+5.43
Vertical Gradient 8/29/89 & 8/30/89:			+7.06/59 =	+0.119
Vertical Gradient 9/28/89:			+5.43/59 =	+0.092

Notes:

- * = Groundwater surface in MW-15 is above the casing. Reported groundwater elevation is actually the elevation of the top of the inner casing.
AMSL = Above mean sea level.

Source: BCM Engineers Inc. (BCM Project No. 00-6471-01)

FIGURES

FIGURES

BCM

2000/02
(2.00)

FIGURES

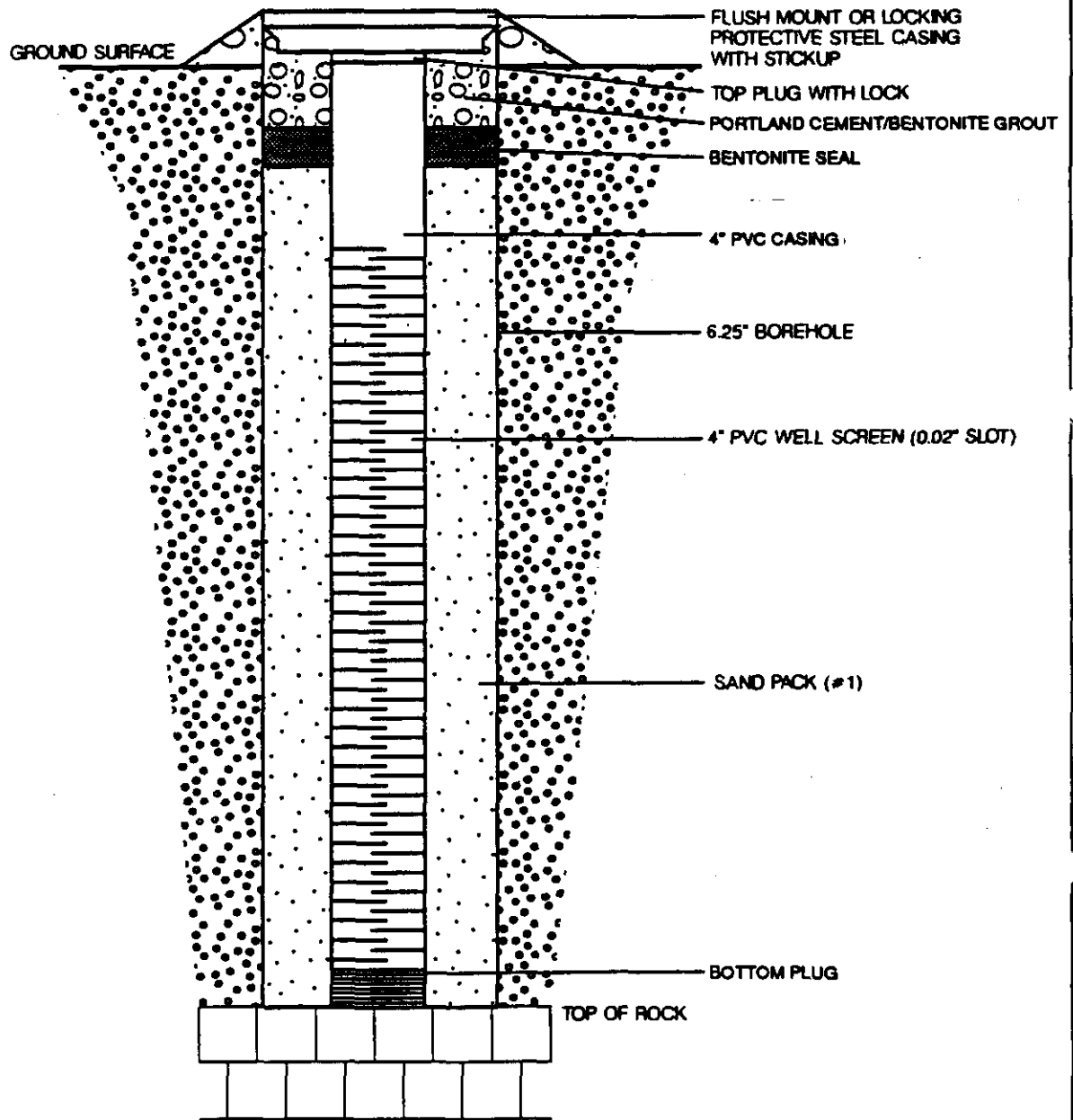


BCM Project No. 00-6471-01



Figure 1
Site Location Map

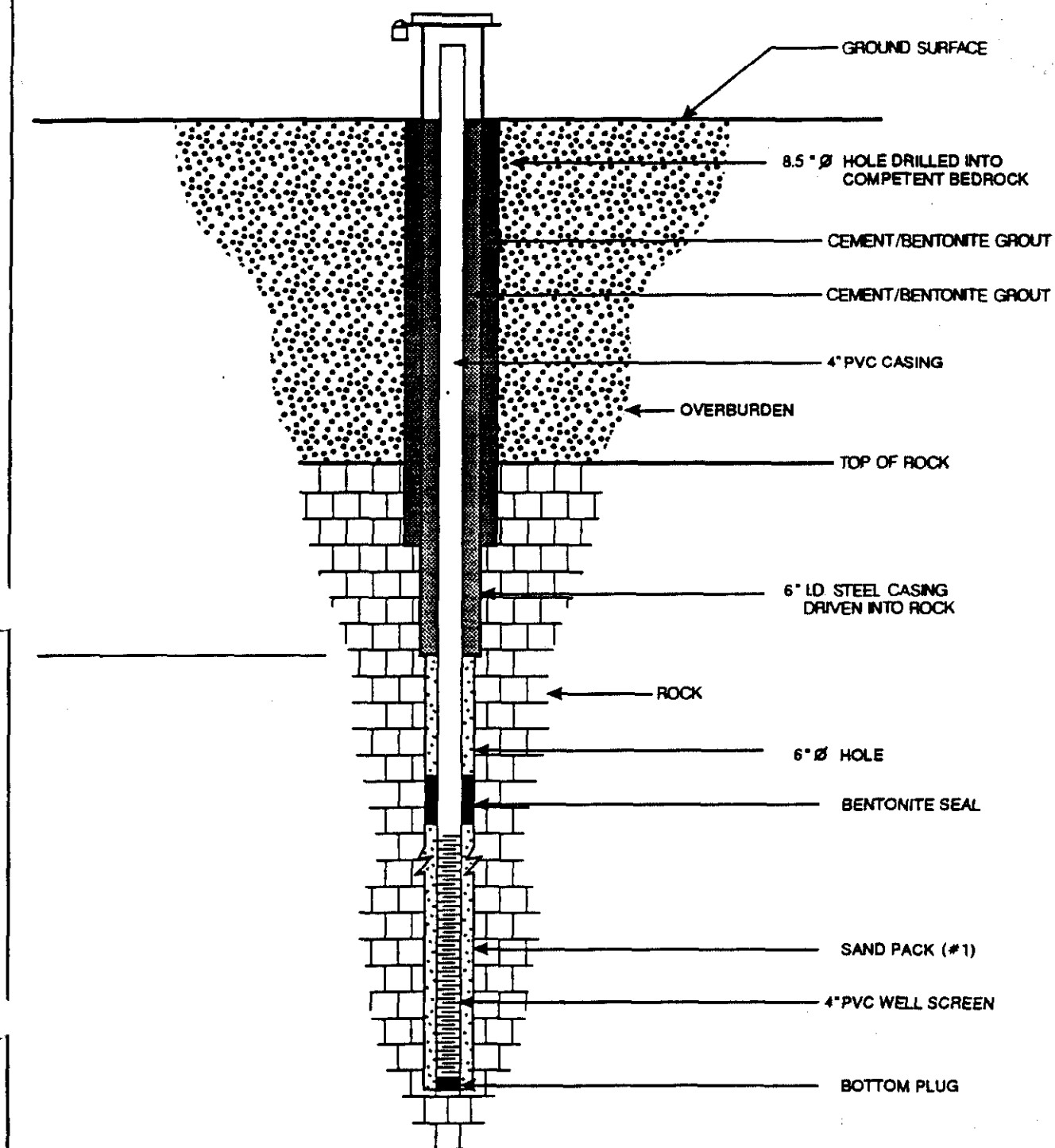
CHARTER
(Red)



NOT TO SCALE

BCM Project No. 00-6471-01

Figure 3
**Schematic Unconsolidated Aquifer
Monitoring Well Construction Diagram**



NOT TO SCALE

BCM Project No. 00-6471-01

Figure 4
Schematic Rock Aquifer
Monitoring Well Construction Diagram

Complaint Tracking System
Complaint Detail Report
Report Date: 03/23/1993

***** Complaint Information *****

Complaint Id: 4056 Related Id: None
County: CHESTER Municipality: EAST WHITELAND TWP
Entered By: LYNDA PAUL Date Received: 01/08/1993
Source: Phone Call Date Ack:

Abbr Descr: SUSPECTED CONTAMINATED SOIL IN REAR OF PROPERTY.
Long Descr: SOIL W/IN 6' OF HEADWATERS OF LITTLE VALLEY CREEK (CHESTER
CO. CONSERVATION GOING OUT NEXT WEEK); BUT SINCE SOIL IS
SUSPECTED OF CONTAMINATION, WANTED WM ALSO INVOLVED.

Location:

***** Complainant Information *****

Name: (b) (6)(b) (6)(b) (6)(b) (6)(b) (6)
Address: (b) (6)(b) (6)(b) (6)(b) (6)(b) (6) Home Phone: (b) (6)(b) (6)(b) (6)(b) (6)
Work Phone: (b) (6)(b) (6)(b) (6)(b) (6)

***** Responsible Party Information *****

Name: Home Phone:
Company: BISHOP TUBE COMPANY Work Phone: (215) 647-3450

Address: PO BOX 1189
RT 30 & MALIN RD
FRAZER, PA 19355

County: CHESTER Municipality: EAST WHITELAND TWP

***** Response Information *****

Bureau: Waste Management Program
Complaint Type: Residual Waste

Date Resp. Assigned: 01/08/1993 Date Due: 01/22/1993
Date First Response: 01/12/1993 Date Resolved: 02/01/1993

Referred To:
Date Referred:

Comments:
Responsible Employee: APRIL FLIPSE
Responsible Supervisor: GARY BONNER

***** Investigation Information *****

Date Inv. Assigned: Date Investigated: Type:

Investigator Name: Violation(Y/N):

Investigation Description:

Complaint Tracking System
Investigation Report
Report Date: 03/23/1993

Complaint Id: 4056 Description: SUSPECTED CONTAMINATED SOIL IN
REAR OF PROPERTY.

Program: Waste Management Program

Complaint Type: Residual Waste

Investigator Name: April Flipse

Date Investigation Assigned: 01/08/1993 Date Investigated: 01/12/1993

Investigation Type: Site Visit Violation: No

Investigation Description:

SITE VISIT W/S. BROWN, TANKS, & STEPHANIE WOOLRIDGE, CC CONSERVATION
DISTRICT. SOILS FROM INDOOR FLOOR WORK, NO EVIDENCE OF CONTAMINATION.
WE ASKED FOR SOILS TO BE REMOVED FROM THE EDGE OF THE CREEK, STORAGE
CLOSER THAN 50FT, DAMS & WATERWAYS REG.; 2/1/93 UPDATE: SITE CLEAN, PILES
GONE.

Complaint Tracking System
Investigation Report
Report Date: 03/23/1993

Complaint Id: 4056 Description: SUSPECTED CONTAMINATED SOIL IN
REAR OF PROPERTY.

Program: Waste Management Program

Complaint Type: Residual Waste

Investigator Name: April Flipse

Date Investigation Assigned: 01/08/1993 Date Investigated: 02/01/1993

Investigation Type: Site Visit

Violation: No

Investigation Description:

SECOND VISIT SHOWS SOILS HAVE BEEN REMOVED

Complaint Tracking System
Complaint Detail Report
Report Date: 03/23/1993

***** Complaint Information *****

Complaint Id: 1048 Related Id: None
County: MONTGOMERY Municipality:
Entered By: LYNDA PAUL Date Received: 11/02/1992
Source: Phone Call Date Ack: 11/02/1992

Abbr Descr: 55 GALLON DRUMS ON SITE FOR A YEAR
Long Descr: BELIEVES FROM GROUNDWATER CLEAN-UP (DRILLING DONE AND FILLED
UP DRUMS); ANY UPDATE ON THIS SITE? OR IDEA WHEN THESE WILL
BE DISPOSED OF? CONTENTS?

Location:

***** Complainant Information *****

Name: (b) (6)(b) (6)(b) (6)(b) (6)(b) (6)(b) (6)(b) (6)
Address: (b) (6)(b) (6)(b) (6)(b) (6)(b) (6)(b) (6)(b) (6)(b) (6)
Home Phone: (b) (6)(b) (6)(b) (6)(b) (6)(b) (6)(b) (6)
Work Phone: (b) (6)(b) (6)(b) (6)(b) (6)(b) (6)(b) (6)

***** Responsible Party Information *****

Name: Home Phone:
Company: SUPERIOR TUBE Work Phone:
Address:

County: Municipality:

***** Response Information *****

Bureau: Water Management Program
Complaint Type: Industrial Waste

Date Resp. Assigned: 11/02/1992 Date Due: 11/16/1992
Date First Response: 11/03/1992 Date Resolved: 11/03/1992

Referred To: EPA - SIBYL HINNANT (215) 597-9800
Date Referred: 11/06/1992

Comments:

Responsible Employee: ROBERT BAUER
Responsible Supervisor: ROBERT BAUER

***** Investigation Information *****

Date Inv. Assigned: Date Investigated: Type:
Investigator Name: Violation(Y/N):
Investigation Description:

APPENDIX B

11/11/11

TETRA TECH, INC. WELL SAMPLING LOG		SHEET: 1 OF 1													
PROJECT: Bishop Tube		PROJECT NO: T4231-10													
WELL DESIGNATION: MW-16		DATE: 9/29/93													
SAMPLE DESIGNATION: BSP-MW-16		ANALYSES: VOC, Cyanide, and Total & Dissolved Metals													
VOLUME OF WATER TO BE REMOVED (1) Depth to bottom of well (from TOC) 21.90 ft (2) Depth to water (from TOC) 8.10 ft (3) Column of water (#1 - #2) 13.80 ft (4) Casing Diameter 4 in (5) Volume Conversion (from table) .653 gal/ft (6) Volume of Water (#3 x #5) 9.01 gal (7) Number of volumes to be evacuated 3 (8) Total volume to be removed (#6 x #7) 27.0 gal Method of purging (pump, bailer) pump		VOLUME CONVERSION: <table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left; width: 60%;">Casing Diameter</th> <th style="text-align: left;">Gallons/Feet</th> </tr> </thead> <tbody> <tr><td>2"</td><td>0.163</td></tr> <tr><td>4"</td><td>0.653</td></tr> <tr><td>6"</td><td>1.469</td></tr> <tr><td>8"</td><td>2.611</td></tr> <tr><td>10"</td><td>4.08</td></tr> </tbody> </table>		Casing Diameter	Gallons/Feet	2"	0.163	4"	0.653	6"	1.469	8"	2.611	10"	4.08
Casing Diameter	Gallons/Feet														
2"	0.163														
4"	0.653														
6"	1.469														
8"	2.611														
10"	4.08														
FIELD ANALYSES															
	START	MID	FINISH												
TIME	1141	1155	1156												
ORP	68	59	58												
pH	7.13	7.23	7.26												
CONDUCTIVITY	.402	.420	.439												
TEMPERATURE	13.5	14.0	13.8												
TOTAL VOLUME PURGED: 30 gal.		TIME: 1156													
NOTES: 1141 - 2 gpm, water started clear, but changed to a light dark brown color; 1156 - well dry															
LOGGED BY: (b) (4)															

ORIGINAL
(b)(4)

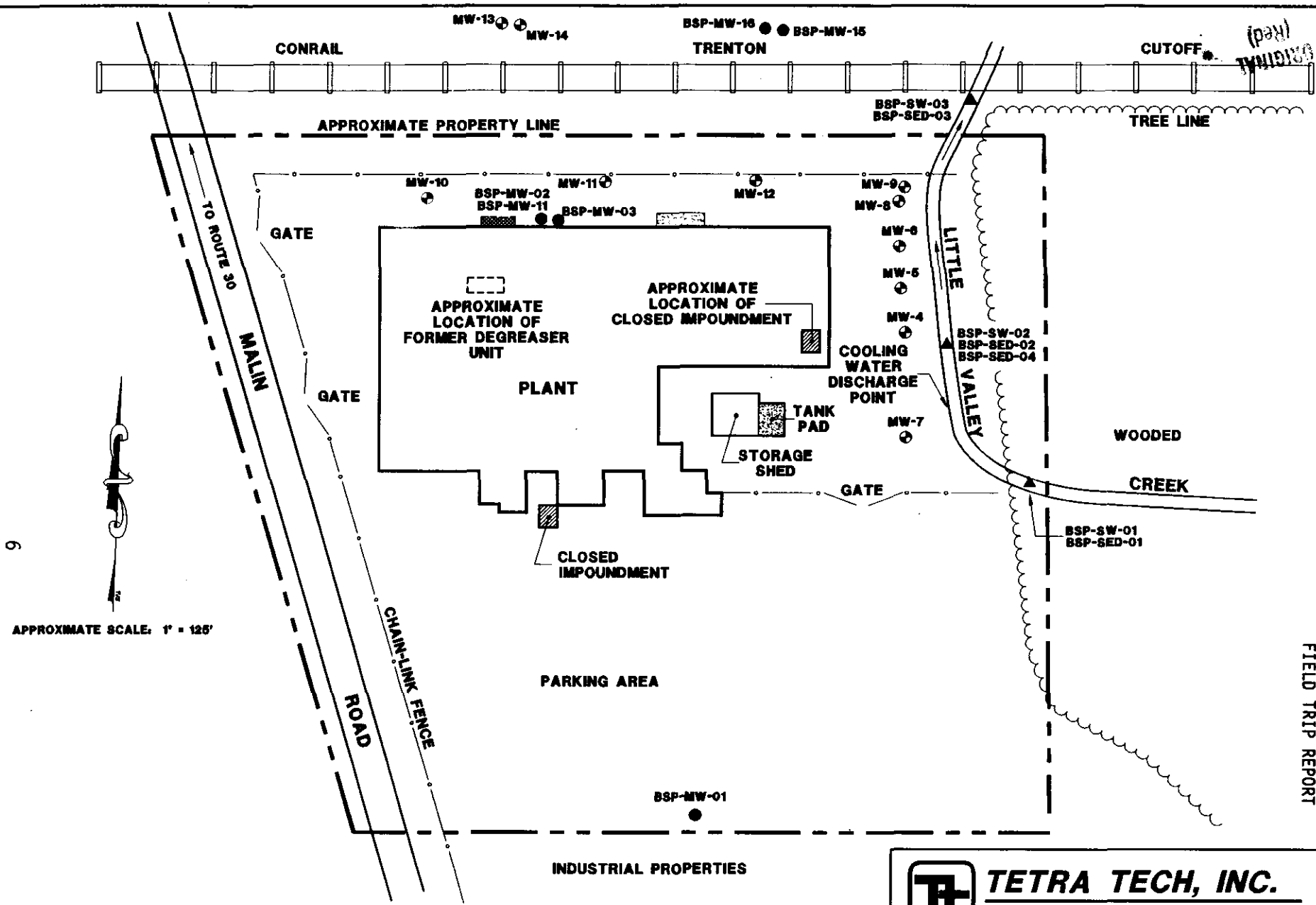
TETRA TECH, INC. WELL SAMPLING LOG		SHEET: 1 OF 1													
PROJECT: Bishop Tube		PROJECT NO: T4231-10													
WELL DESIGNATION: MW-1		DATE: 9/29/93													
SAMPLE DESIGNATION: BSP-MW-1		ANALYSES: VOC, Cyanide, and Total & Dissolved Metals													
VOLUME OF WATER TO BE REMOVED (1) Depth to bottom of well (from TOC) 47.40 ft (2) Depth to water (from TOC) 16.18 ft (3) Column of water (#1 - #2) 31.22 ft (4) Casing Diameter 4 in (5) Volume Conversion (from table) .653 gal/ft (6) Volume of Water (#3 x #5) 20.39 gal (7) Number of volumes to be evacuated 3 (8) Total volume to be removed (#6 x #7) 61.17 gal Method of purging (pump, bailer) pump		VOLUME CONVERSION: <table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Casing Diameter</th> <th style="text-align: left;">Gallons/Feet</th> </tr> </thead> <tbody> <tr> <td>2"</td> <td>0.163</td> </tr> <tr> <td>4"</td> <td>0.653</td> </tr> <tr> <td>6"</td> <td>1.469</td> </tr> <tr> <td>8"</td> <td>2.611</td> </tr> <tr> <td>10"</td> <td>4.08</td> </tr> </tbody> </table>		Casing Diameter	Gallons/Feet	2"	0.163	4"	0.653	6"	1.469	8"	2.611	10"	4.08
Casing Diameter	Gallons/Feet														
2"	0.163														
4"	0.653														
6"	1.469														
8"	2.611														
10"	4.08														
FIELD ANALYSES															
	START	MID	FINISH												
TIME	0958	1005	1011												
ORP	129	123	136												
pH	6.07	6.11	6.14												
CONDUCTIVITY	.096	.080	.087												
TEMPERATURE	11.7	11.8	11.8												
TOTAL VOLUME PURGED: 65+ gal.		TIME: 1011													
NOTES: 0953 - water clear and colorless, purge rate 5 gpm; 1011 - water clear and colorless.															
LOGGED BY: (b) (4)(b) (4)															

TETRA TECH, INC. WELL SAMPLING LOG		SHEET: 1 OF 1													
PROJECT: Bishop Tube		PROJECT NO: T4231-10													
WELL DESIGNATION: MW-2		DATE: 9/29/93													
SAMPLE DESIGNATION: BSP-MW-2		ANALYSES: VOC, Cyanide, and Total & Dissolved Metals													
VOLUME OF WATER TO BE REMOVED (1) Depth to bottom of well (from TOC) 22.95 ft (2) Depth to water (from TOC) 8.23 ft (3) Column of water (#1 - #2) 14.72 ft (4) Casing Diameter 4 in (5) Volume Conversion (from table) .653 gal/ft (6) Volume of Water (#3 x #5) 9.61 gal (7) Number of volumes to be evacuated 3 (8) Total volume to be removed (#6 x #7) 28.83 gal Method of purging (pump, bailer) pump		VOLUME CONVERSION: <table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Casing Diameter</th> <th style="text-align: left;">Gallons/Feet</th> </tr> </thead> <tbody> <tr><td>2"</td><td>0.163</td></tr> <tr><td>4"</td><td>0.653</td></tr> <tr><td>6"</td><td>1.469</td></tr> <tr><td>8"</td><td>2.611</td></tr> <tr><td>10"</td><td>4.08</td></tr> </tbody> </table>		Casing Diameter	Gallons/Feet	2"	0.163	4"	0.653	6"	1.469	8"	2.611	10"	4.08
Casing Diameter	Gallons/Feet														
2"	0.163														
4"	0.653														
6"	1.469														
8"	2.611														
10"	4.08														
FIELD ANALYSES															
	START	MID	FINISH												
TIME	1517	1522	1527												
ORP	08	-57	-66												
pH	7.26	7.14	7.13												
CONDUCTIVITY	.450	.461	.467												
TEMPERATURE	15.4	15.9	15.9												
TOTAL VOLUME PURGED: 30 gal.		TIME: 1527													
NOTES: 1517 - 3 gpm, water is clear light brown.															
LOGGED BY: (b) (4)															

ORIGINAL
(Red)

TETRA TECH, INC. WELL SAMPLING LOG		SHEET: 1 OF 1													
PROJECT: Bishop Tube		PROJECT NO: T4231-10													
WELL DESIGNATION: MW-3		DATE: 9/29/93													
SAMPLE DESIGNATION: BSP-MW-3		ANALYSES: VOC, Cyanide, and Total & Dissolved Metals													
VOLUME OF WATER TO BE REMOVED (1) Depth to bottom of well (from TOC) 14.00 ft (2) Depth to water (from TOC) 7.57 ft (3) Column of water (#1 - #2) 6.43 ft (4) Casing Diameter 4 in (5) Volume Conversion (from table) .653 gal/ft (6) Volume of Water (#3 x #5) 4.2 gal (7) Number of volumes to be evacuated 3 (8) Total volume to be removed (#6 x #7) 12.6 gal Method of purging (pump, bailer) pump		VOLUME CONVERSION: <table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Casing Diameter</th> <th style="text-align: left;">Gallons/Feet</th> </tr> </thead> <tbody> <tr> <td>2"</td> <td>0.163</td> </tr> <tr> <td>4"</td> <td>0.653</td> </tr> <tr> <td>6"</td> <td>1.469</td> </tr> <tr> <td>8"</td> <td>2.611</td> </tr> <tr> <td>10"</td> <td>4.08</td> </tr> </tbody> </table>		Casing Diameter	Gallons/Feet	2"	0.163	4"	0.653	6"	1.469	8"	2.611	10"	4.08
Casing Diameter	Gallons/Feet														
2"	0.163														
4"	0.653														
6"	1.469														
8"	2.611														
10"	4.08														
FIELD ANALYSES															
	START	MID	FINISH												
TIME	1600	1612													
ORP	-40	6													
pH	7.56	7.40													
CONDUCTIVITY	.327	-													
TEMPERATURE	17.5	17.6													
TOTAL VOLUME PURGED: 8 gal.		TIME: 1612													
NOTES: 1600 - 2 gpm; 1602 - dry, 4 gal; 1609 - 1 gpm; 1612 - well dry, 4 gal.															
LOGGED BY: (b) (4)															

TETRA TECH, INC. WELL SAMPLING LOG		SHEET: 1 OF 1													
PROJECT: Bishop Tube		PROJECT NO: T4231-10													
WELL DESIGNATION: MW-15		DATE: 9/29/93													
SAMPLE DESIGNATION: BSP-MW-15		ANALYSES: VOC, Cyanide, and Total & Dissolved Metals													
VOLUME OF WATER TO BE REMOVED (1) Depth to bottom of well (from TOC) 79.45 ft (2) Depth to water (from TOC) 0.0* ft (3) Column of water (#1 - #2) 79.45 ft (4) Casing Diameter 4 in (5) Volume Conversion (from table) .653 gal/ft (6) Volume of Water (#3 x #5) 51.9 gal (7) Number of volumes to be evacuated 3 (8) Total volume to be removed (#6 x #7) 155.6 gal Method of purging (pump, bailer) pump		VOLUME CONVERSION: <table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Casing Diameter</th> <th style="text-align: left;">Gallons/Feet</th> </tr> </thead> <tbody> <tr><td>2"</td><td>0.163</td></tr> <tr><td>4"</td><td>0.653</td></tr> <tr><td>6"</td><td>1.469</td></tr> <tr><td>8"</td><td>2.611</td></tr> <tr><td>10"</td><td>4.08</td></tr> </tbody> </table> * flowing over top of casing.		Casing Diameter	Gallons/Feet	2"	0.163	4"	0.653	6"	1.469	8"	2.611	10"	4.08
Casing Diameter	Gallons/Feet														
2"	0.163														
4"	0.653														
6"	1.469														
8"	2.611														
10"	4.08														
FIELD ANALYSES															
	START	MID	FINISH												
TIME	1236	1249													
ORP	40	-16													
pH	7.19	7.14													
CONDUCTIVITY	.360	.359													
TEMPERATURE	13.4	13.0													
TOTAL VOLUME PURGED: 66 gal.		TIME: 1304													
NOTES: 1236 - 5 gpm, water is clear and colorless; 1241 - water level dropped to level of pump, well dry, 31 gal; 1253 - well dry, 20 gal. purged; 1301 - started purging; 1304 - well dry, 15 gal; 66 gal. total.															
LOGGED BY: (b) (4)															



9

LEGEND

FORMER SOLVENT STORAGE TANK PAD

MONITORING WELL AND NUMBER

SURFACE WATER/SEDIMENT SAMPLE

MONITORING WELL **SAMPLE**

~~SECRET~~

● MW-1

▲

● MW-1



TETRA TECH, INC.

FIGURE 3
SAMPLE LOCATION PLAN
BISHOP TUBE COMPANY
FRAZER, CHESTER COUNTY
PENNSYLVANIA

APPENDIX C

DATA SUMMARY FORM: VOLATILES I

Site Name BISHOP TUBE COMPANYWATER SAMPLES
(µg/L)see #: 20899 Sampling Date(s): 9/29/93To calculate sample quantitation limits:
(CRQL * Dilution Factor)

CRQL	COMPOUND	Sample No. Dilution Factor Location		CNA51	CNA52	CNA53	CNA54	CNA55	CNA56	CNA57	CNA58	CNA59
				1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
				ESP-MW-01	RSP-MW-02	RSP-MW-03	RSP-MW-21	RSP-MW-15	RSP-MW-16	RSP-SW-01	RSP-SW-03	RSP-SW-02
				BACKGROUND MONITORING WELL #01	MONITORING WELL #02	MONITORING WELL #03, PAIRED WITH MW-02	DUP. OF RSP-MW-02	MONITORING WELL #15, OFFSITE	MONITORING WELL #16, PAIRED WITH MW-15	UPSTREAM	DOWNSTREAM	DOWNSTREAM OF OUTFALL
10	Chloromethane											
10	Bromomethane											
10	*Vinyl Chloride											
10	Chloroethane											
10	*Methylene Chloride	3	B	2,800	B	480	B	2,300	B	450	B	6 J
10	Acetone											
10	Carbon Disulfide											
10	*1,1-Dichloroethene				J		J		J		J	
10	1,1-Dichloroethane				J		J		J		J	
10	*Total 1,2-Dichloroethene				J		J		J		J	
10	Chloroform			6	B			6	B			
10	*1,2-Dichloroethane											
10	*2-Butanone			8	J							
10	*1,1,1-Trichloroethane											
10	*Carbon Tetrachloride											
10	Vinyl Acetate											
10	Bromodichloromethane											

RQL = Contract Required Quantitation Limit

Action Level Exists

SEE NARRATIVE FOR CODE DEFINITIONS
revised 07/92

WATER SAMPLES
($\mu\text{g/L}$)

To calculate sample quantitation limits:
(CRQL * Dilution Factor)

CRQL = Contract Required Quantitation Limit

***Action Level Exists**

SEE NARRATIVE FOR CODE DEFINITIONS
revised 07/92

WATER SAMPLES
($\mu\text{g/L}$)

ase #: 20999 Sampling Date(s): 9/29/93

To calculate sample quantitation limit:
(CRQL * Dilution Factor)

[illegible]

RQL = Contract Required Quantitation Limit

Action Level Exists

SEE NARRATIVE FOR CODE DEFINITIONS
revised 07/92

(μg/L)

To calculate sample quantitation limits:
(CRQL * Dilution Factor)

revised .07/92

SOIL SAMPLES

Case # 20899 Sampling Date(s): 9/29/93

[illegible]

SEE NARRATIVE FOR CODE DEFINITIONS:
revised 07/92

SOIL SAMPLES
($\mu\text{g/Kg}$)

Case #: 20899 Sampling Date(s): 9/29/93

To calculate sample quantitation limit:
 $(CROL * Dilution Factor) / ((100 - \% moisture)/100)$

[illegible]

SEE NARRATIVE FOR CODE DEFINITIONS
revised 07/92

Site Name: BISHOP TUBE COMPANY

SOIL SAMPLES
(mg/Kg)

Case #: 20899 Sampling Date(s): 9/29/93

+Due to dilution, sample quantitation limit is affected.
See dilution table for specifics.

[illegible]

CRDL = Contract Required Detection Limit

***Action Level Exists**

SEE NARRATIVE FOR CODE DEFINITIONS
revised 07/90

DATA SUMMARY FORM: I N O R G A N I C S

Page 2 of 2

ORIGINAL
(Red)

Site Name: BISHOP TUBE COMPANY

WATER SAMPLES
(µg/L)

Case #: 20899 Sampling Date(s): 9/29/93

+Due to dilution, sample quantitation limit is affected.
See dilution table for specifics.

FILTERED

Sample No. Dilution Factor Location		MCLF 46	MCLF 47	MCLF 48	MCLF 49	MCLF 50	MCLF 98	MCLF 99										
CRDL ANALYTE		BSP-MW-01 BACKGROUND MONITORING WELL #01	BSP-MW-02 MONITORING WELL #02	BSP-MW-03 MONITORING WELL #03, PAIRED W/MW-02	BSP-MW-21 DUP. OF BSP-MW-02	BSP-MW-15 MONITORING WELL #15, OFFSITE	BSP-FB-01 FIELD BLANK	BSP-MW-16 MONITORING WELL #16, PAIRED W/ MW-15										
200	Aluminum																	
60	Antimony																	
10	*Arsenic																	
200	Barium	10.3	58.3	51.9	55.0	53.0		15.1										
5	Beryllium																	
5	*Cadmium																	
5000	Calcium	10,000	50,100	60,300	79,900	77,400	109	75,100										
10	*Chromium																	
50	Cobalt																	
25	Copper																	
100	Iron	14.1	B	11.3	B	11.3	299	11.3										
3	*Lead																	
5000	Magnesium	5,100	12,200	8,090	11,900	11,300		10,800										
15	Manganese		2,900	1,590	2,820	2,400												
0.2	Mercury					0.99												
40	*Nickel																	
5000	Potassium		1,040	1,630														
5	Selenium	2.5	B															
10	Silver																	
5000	Sodium	3,300	7,050	21,300	6,850	11,100		10,000										
10	Thallium																	
50	Vanadium																	
20	Zinc																	
10	*Cyanide		Q	Q	Q	Q	Q	Q										

CRDL = Contract Required Detection Limit

*Action Level Exists

SEE NARRATIVE FOR CODE DEFINITIONS
revised 07/90

DATA SUMMARY FORM: I N O R G A N I C S

Site Name: BISHOP TUBE COMPANYWATER SAMPLES
(µg/L)Case #: 20899 Sampling Date(s): 9/29/93+Due to dilution, sample quantitation limit is affected.
See dilution table for specifics.

Sample No. Dilution Factor Location		MCLF S1	MCLF S2	MCLF S3	MCLF S4	MCLF S5	MCLF S6	MCLF S7	MCLF S8	MCLF S9
		BSP-MW-01	BSP-MW-02	BSP-MW-03	BSP-MW-21	BSP-MW-15	BSP-FB-01	BSP-MW-16	BSP-SW-01	BSP-SW-03
CRDL	ANALYTE	BACKGROUND, MONITORING WELL # 01	MONITORING WELL # 02	MONITORING WELL # 03, PAIRED W/ MW-02	DUP. OF BSP-MW-02	MONITORING WELL # 15, OFFSITE	FIELD BLANK	MONITORING WELL # 16, PAIRED W/ MW-15	UPSTREAM	DOWNSTREAM OF OUTFALL
200	Aluminum			1.140				2.990	141	195
60	Antimony									175
10	*Arsenic							1.7		
200	Barium	10.1	59.9	63.7	61.4	54.5		34.4	17.0	23.8
5	Beryllium									
5	*Cadmium									
5000	Calcium	10,200	80,600	66,300	83,600	79,400	132	77,400	15,800	20,700
10	*Chromium							23.4		18.4
50	Cobalt			8.7						19.0
25	Copper							9.4		
100	Iron	207	925	2,800	947	3.2		13,500	429	147
3	*Lead			3.4 B				7.3	1.3 B	367
5000	Magnesium	5,130	12,200	8,900	12,600	11,400		12,400	6,480	1.3 B
15	Manganese	2.1	2.990	1.000	3.000	2.000		616	26.3	9.320
0.2	Mercury									26.7
40	*Nickel							20.1		
5000	Potassium			1,460				1,110		20.5
5	Selenium							2.6 B	1,290	1,650
10	Silver								2.2	
5000	Sodium	3,360	7,050	22,100	7,330	11,400		9,980	13,800	
10	Thallium				2.0 B				13,100	15,900
50	Vanadium									
20	Zinc							24.2		33.7
10	*Cyanide									

CRDL = Contract Required Detection Limit

*Action Level Exists

SEE NARRATIVE FOR CODE DEFINITIONS

revised 07/90

ORIGINAL
1/8/94



Phone: (410) 268-7705
Fax: (410) 268-8472

SUBJECT: Level M2 Organic Data Validation for Case 20899
Site: Bishop Tube Company

(b) (4)(b) (4)(b) (4)(b) (4)(b) (4)(b) (4)(b) (4)(b) (4)(b) (4)(b) (4)(b) (4)(b) (4)(b) (4)(b) (4)(b) (4)(b) (4)(b) (4)(b) (4)
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 Organic Data Reviewer Senior Oversight Chemist

TO: Cynthia E. Caporale
ESAT Regional Project Officer

(b) (4)(b) (4)(b) (4)(b) (4)(b) (4)(b) (4)
(b) (4)(b) (4)(b) (4)(b) (4)(b) (4)(b) (4)
ESAT Team Manager

Case 20899 consisted of eleven (11) aqueous and four (4) soil samples submitted to NYTEST Environmental, Inc. (NYTEST) for volatile analysis. The case included one (1) trip blank and one (1) field blank. One (1) aqueous and one (1) soil field duplicate pairs were also analyzed. Samples were analyzed as a Contract Laboratory Program (CLP) Routine Analytical Service (RAS).

All samples were successfully analyzed for all target compounds. All instrument and method sensitivities were according to the Contract Laboratory Program (CLP) Routine Analytical Service (RAS) protocol.

o Several compounds failed precision criteria in the initial and continuing calibrations. In the initial calibration dated 9/17/93 (soil samples), the positive results for methylene chloride were qualified "J", but this qualifier was superseded by the "B" qualifier. In the continuing calibration dated 10/6/93, when the percent difference (%D) was greater than fifty percent (>50%), quantitation limits were qualified "UJ" for these compounds in the affected samples. See Forms VI and VII in Appendix D.

UNCLASSIFIED
(Reg)

- o In the initial analyses of samples CNA52, CNA54 and CNA56, 1,1-dichloroethane or 1,1-dichloroethene exceeded the linear calibration range and were not detected in the diluted analyses. Positive results for these compounds were qualified "J" on the Form Is for the affected samples. See the initial analyses Form Is in Appendix B, and the diluted analyses Form Is and Case Narrative in Appendix D.

NOTES

- o In the analysis of sample CNA54, 1,1,1-trichloroethane was detected at the Ten-Day Health Advisory Limit of 35,000 µg/L. The Remedial Project Manager (RPM) was notified of the elevated level for this compound. See Form I in Appendix B and phone log in Appendix D.
- o The laboratory mistakenly entered sample CNA64 as CNA67. The Form I was corrected by the data reviewer. See Form I in Appendix B and letter from the laboratory in Appendix D.
- o The maximum concentration of all compounds found in the analyses of the trip, field and laboratory method blanks are listed below. Samples with concentrations of common laboratory contaminants less than ten times (<10X) the blank concentration or other contaminants less than five times (<5X) the blank concentration have been qualified "B" on the Form Is.

<u>Compound</u>	<u>Concentration</u>
methylene chloride *	19 µg/Kg
acetone *	33 µg/Kg
chloroform	30 µg/L
bromodichloromethane	4 J µg/L

* Common Laboratory Contaminant

- o In the initial analyses of samples CNA52, CNA53, CNA54, CNA55, and CNA56, several compounds exceeded the linear calibration range and were reanalyzed at a 100X or 500X dilution. The results for these compounds were reported from the diluted analyses and marked with an asterisk (*). See the initial analyses Form Is in Appendix B, and the dilution analyses Form Is and Case Narrative in Appendix D.
- o Methylene chloride, a common laboratory contaminant, was detected in the diluted analyses of samples CNA52, CNA53, CNA54, and CNA55. The results for this compound are false positives due to laboratory contamination. These results were reported from the diluted analyses and marked with an asterisk (*). See the initial analyses Form Is in Appendix B, and the dilution analyses Form Is and Case Narrative in Appendix D.

- o The 1,1-dichloroethene result for sample CNA56 exceeded the linear calibration range in the initial analysis and was not detected in the 100X dilution. The CRQL of this compound in the diluted analysis was 1000 µg/L. Since this compound has a Ten-Day Health Advisory Limit of 1000 µg/L, the chromatograms of both analyses were checked to ensure the absence of this compound at the health advisory limit. See quantitation reports in Appendix D.
- o The MS/MSD analyses of sample CNA53 had one (1) out of five (5) relative percent difference (RPD) results and two (2) out of ten (10) spike recoveries outside the QC limits. See Form III VOA-1 in Appendix D.
- o In the MS/MSD analyses of sample CNA53, 1,2-dichloroethene (total), 1,1,1-trichloroethane, and trichloroethene exceeded the linear calibration range. These results were qualified with an "E" by the laboratory. See Form Is in Appendix D.
- o One (1) aqueous (CNA52 and CNA54) and one (1) soil (CNA62 and CNA64) field duplicate pairs were analyzed. See Form Is in Appendix B and shipping log in Appendix D.
- o The tentatively identified compounds (TICs) in Appendix C were reviewed and corrected during data validation. Compounds identified as blank contaminants or common laboratory contaminants were crossed off the TIC Form Is.

All data for Case 20899 were reviewed in accordance with the Level M2 Innovative Approach for Validation of Organic Data in conjunction with the National Functional Guidelines for Evaluating Organic Analyses with Modification for use within Region III. The text of the report addresses only those problems affecting usability.

ATTACHMENTS

- 1) Appendix A - Glossary of Data Qualifiers
- 2) Appendix B - Results as Reported by the Laboratory and Qualified by the Data Reviewer for All Target Compounds
- 3) Appendix C - Reviewed and Corrected Tentatively Identified Compounds
- 4) Appendix D - Support Documentation

DCN:EL312A05.BIS

nytest environmental inc.

SDG Narrative

ORIGINAL
11-2-78

Contract No.: 68-D1-0079
Case No.: 20899
SDG No.: CNA51
Log In No.: 18379

VOLATILE FRACTION

System Monitoring Compounds

All recoveries met QC criteria.

Matrix Spike/Matrix Spike Duplicate (MS/MSD)

Sample CNA63 was utilized for the low level soil MS/MSD. All spike recoveries and RPD values were within QC limits. Sample CNA53 was utilized for the water MS/MSD. Two spike recoveries and one RPD value were outside the advisory QC limits. This is a result of the high concentrations of Trichloroethene in the original unspiked sample. Concentrations of 1,2-Dichloroethene (total), 1,1,1-Trichloroethane and Trichloroethene exceeded the calibration range of the instrument in CNA53MS and CNA53MSD. These results are consistent with the unspiked sample, CNA53.

Method Blank

Methylene Chloride was detected in VBLK39 and VBLK40 at a concentration within QC limits. Methylene Chloride and Acetone were detected in VBLK37 at concentrations within QC limits.

Calibrations

The initial and continuing calibrations passed QC criteria.

Internal Standards

All retention times and area responses were within QC limits.

0000004

nytest environmental_{inc}

SDG Narrative

Contract No.: 68-D1-0079
Case No.: 20899
SDG No.: CNA51
Log In No.: 18379

VOLATILE FRACTION CONT'D.

Samples

Target compound concentrations exceeded the calibration range of the instrument in CNA52, CNA53, CNA53MS, CNA53MSD, CNA54, and CNA56. CNA53, CNA55 and CNA56 were reanalyzed at 50ul (1:100 dilution) as CNA53DL, CNA55DL and CNA56DL respectively. CNA52 and CNA54 were reanalyzed at 10ul (1:500 dilution) as CNA52DL and CNA54DL respectively. TIC peaks labeled "Unknown Siloxane" are most likely contamination due to the degradation of the column material. The raw concentrations of 1,1-Dichloroethene and 1,1,1-Trichloroethane were manually edited on the quantitation report for sample CNA52 since a reintegration was performed to incorporate the entire peak area of the split peaks. The raw concentration has been edited on the spectra only. The quantitation report has the correct value. 1,1-Dichloroethane was not detected in CNA52DL, CNA54DL and CNA56DL while detected in the undiluted analysis of each sample. This is due to the high dilution of each DL. All samples were analyzed as per EPA CLP (3/90). No further problems were encountered.

0000005

ORIGINAL
(Rev)

GLOSSARY OF DATA QUALIFIER CODES (ORGANIC)

CODES RELATED TO IDENTIFICATION

(confidence concerning presence or absence of compounds)

U = Not detected. The associated number indicates approximate sample concentration necessary to be detected.

NO CODE = Confirmed identification.

B = Not detected substantially above the level reported in laboratory or field blanks.

R = Unreliable result. Analyte may or may not be present in the sample. Supporting data necessary to confirm result.

N = Tentative identification. Consider present. Special methods may be needed to confirm its presence or absence in future sampling efforts.

CODES RELATED TO QUANTITATION

(can be used for both positive results and sample quantitation limits):

J = Analyte present. Reported value may not be accurate or precise.

K = Analyte present. Reported value may be biased high. Actual value is expected to be lower.

L = Analyte present. Reported value may be biased low. Actual value is expected to be higher.

UJ = Not detected, quantitation limit may be inaccurate or imprecise.

UL = Not detected, quantitation limit is probably higher.

OTHER CODES

Q = No analytical result.

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

Sample Location: BSP-MW-01

Background

CNA51

Lab Name: NYTEST ENV INC

Contract: 9320437

Lab Code: NYTEST

Case No.: 20899

SAS No.: _____

SDG No.: CNA51

Matrix: (soil/water) WATER

Lab Sample ID: 1837901

Sample wt/vol: 5.0 (g/mL) ML

Lab File ID: N3096

Level: (low/med) LOW

Date Received: 09/30/93

% Moisture: not dec. _____

Date Analyzed: 10/07/93

GC Column: CAP ID: 0.530 (mm)

Dilution Factor: 1.0

Soil Extract Volume: _____ (uL)

Soil Aliquot Volume: _____ (uL)

CONCENTRATION UNITS:

CAS NO.

COMPOUND

(ug/L or ug/Kg) UG/L

Q

74-87-3	Chloromethane	10	U
74-83-9	Bromomethane	10	U
75-01-4	Vinyl Chloride	10	U
75-00-3	Chloroethane	10	U
75-09-2	Methylene Chloride	3	38
67-64-1	Acetone	10	U
75-15-0	Carbon Disulfide	10	U
75-35-4	1,1-Dichloroethene	10	U
75-34-3	1,1-Dichloroethane	10	U
540-59-0	1,2-Dichloroethene (total)	10	U
67-66-3	Chloroform	10	U
107-06-2	1,2-Dichloroethane	10	U
78-93-3	2-Butanone	10	U
71-55-6	1,1,1-Trichloroethane	10	U
56-23-5	Carbon Tetrachloride	10	U
75-27-4	Bromodichloromethane	10	U
78-87-5	1,2-Dichloropropane	10	U
10061-01-5	cis-1,3-Dichloropropene	10	U
79-01-6	Trichloroethene	10	U
124-48-1	Dibromochloromethane	10	U
79-00-5	1,1,2-Trichloroethane	10	U
71-43-2	Benzene	10	U
10061-02-6	trans-1,3-Dichloropropene	10	U
75-25-2	Bromoform	10	U
108-10-1	4-Methyl-2-Pentanone	10	U
591-78-6	2-Hexanone	10	U
127-18-4	Tetrachloroethene	10	U
79-34-5	1,1,2,2-Tetrachloroethane	10	U
108-88-3	Toluene	10	U
108-90-7	Chlorobenzene	10	U
100-41-4	Ethylbenzene	10	U
100-42-5	Styrene	10	U
1330-20-7	Xylene (total)	10	U

EL
12/10/93

0000010

1A

EPA SAMPLE NO.

VOLATILE ORGANICS ANALYSIS DATA SHEET

Sample Location: BSP-MW-02

CNA52

Field Dupl:
of CNASORIGINAL
10/04

Lab Name: NYTEST ENV INC

Contract: 68-D1-0079

Lab Code: NYTEST

Case No.: 20899

SAS No.: _____

SDG No.: CNA51

Matrix: (soil/water) WATER

Lab Sample ID: 1837902

Sample wt/vol: 5.0 (g/mL) ML

Lab File ID: N3097

Level: (low/med) LOW

Date Received: 09/30/93

% Moisture: not dec. _____

Date Analyzed: 10/07/93

GC Column: CAP ID: 0.530 (mm)

Dilution Factor: 1.0

Soil Extract Volume: _____ (uL)

Soil Aliquot Volume: _____ (uL)

CONCENTRATION UNITS:

CAS NO.

COMPOUND

(ug/L or ug/Kg) UG/L

Q

74-87-3-----	Chloromethane	10	U
74-83-9-----	Bromomethane	10	U
75-01-4-----	Vinyl Chloride	10	U
75-00-3-----	Chloroethane	10	U
75-09-2-----	Methylene Chloride	2800* B	U
67-64-1-----	Acetone	10	U
75-15-0-----	Carbon Disulfide	10	U
75-35-4-----	1,1-Dichloroethene	590* J	E
75-34-3-----	1,1-Dichloroethane	360	J
540-59-0-----	1,2-Dichloroethene (total)	1000* J	E
67-66-3-----	Chloroform	6 8 J	
107-06-2-----	1,2-Dichloroethane	10	U
78-93-3-----	2-Butanone	8	J
71-55-6-----	1,1,1-Trichloroethane	35,000*	E
56-23-5-----	Carbon Tetrachloride	10	U
75-27-4-----	Bromodichloromethane	10	U
78-87-5-----	1,2-Dichloropropane	10	U
10061-01-5-----	cis-1,3-Dichloropropene	10	U
79-01-6-----	trans-1,3-Dichloropropene	25,000*	E
124-48-1-----	Dibromochloromethane	10	U
79-00-5-----	1,1,2-Trichloroethane	24	
71-43-2-----	Benzene	10	U
10061-02-6-----	trans-1,3-Dichloropropene	10	U
75-25-2-----	Bromoform	10	U
108-10-1-----	4-Methyl-2-Pentanone	10	U
591-78-6-----	2-Hexanone	10	U
127-18-4-----	Tetrachloroethene	51	
79-34-5-----	1,1,2,2-Tetrachloroethane	10	U
108-88-3-----	Toluene	8	J
108-90-7-----	Chlorobenzene	10	U
100-41-4-----	Ethylbenzene	10	U
100-42-5-----	Styrene	10	U
1330-20-7-----	Xylene (total)	10	U

EL
12/13/93

0000012

* = Results Reported from Dilution

VOLATILE ORGANICS ANALYSIS DATA SHEET

Sample Location: BSP-MW-03

CNA53

Lab Name: NYTEST ENV INC

Contract: 9320437

Lab Code: NYTEST

Case No.: 20899

SAS No.: _____

SDG No.: CNA51

Matrix: (soil/water) WATER

Lab Sample ID: 1837903

Sample wt/vol: 5.0 (g/mL) ML

Lab File ID: N3098

Level: (low/med) LOW

Date Received: 09/30/93

% Moisture: not dec. _____

Date Analyzed: 10/07/93

GC Column: CAP ID: 0.530 (mm)

Dilution Factor: 1.0

Soil Extract Volume: _____ (uL)

Soil Aliquot Volume: _____ (uL)

CONCENTRATION UNITS:

CAS NO.

COMPOUND

(ug/L or ug/Kg) UG/L

Q

74-87-3	Chloromethane	10	U
74-83-9	Bromomethane	10	U
75-01-4	Vinyl Chloride	10	U
75-00-3	Chloroethane	10	U
75-09-2	Methylene Chloride	480* 8	U
67-64-1	Acetone	10	U
75-15-0	Carbon Disulfide	10	U
75-35-4	1,1-Dichloroethene	50	U
75-34-3	1,1-Dichloroethane	11	U
540-59-0	1,1-Dichloroethane (total)	560* J	U
67-65-3	Chloroform	10	U
107-06-2	1,2-Dichloroethane	10	U
73-93-3	2-Butanone	10	U
71-55-6	1,1,1-Trichloroethane	790* J	U
56-23-5	Carbon Tetrachloride	10	U
75-27-4	Bromodichloromethane	10	U
78-87-5	1,2-Dichloropropane	10	U
10061-01-5	cis-1,3-Dichloropropene	10	U
79-01-6	1,1,2,2-Tetrachloroethane	13000* J	U
124-48-1	Dibromochloromethane	10	U
79-00-5	1,1,2-Trichloroethane	10	U
71-43-2	Benzene	10	U
10061-02-6	trans-1,3-Dichloropropene	10	U
75-25-2	Bromoform	10	U
108-10-1	4-Methyl-2-Pentanone	10	U
591-78-6	2-Hexanone	10	U
127-18-4	Tetrachloroethene	5	J
79-34-5	1,1,2,2-Tetrachloroethane	10	U
108-88-3	Toluene	10	U
108-90-7	Chlorobenzene	10	U
100-41-4	Ethylbenzene	10	U
100-42-5	Styrene	10	U
1330-20-7	Xylene (total)	10	U

* = Result Reported From Dilution

EL
12/13/93

0000016

VOLATILE ORGANICS ANALYSIS DATA SHEET

Sample Location: BSP-MW-21

CNA54

Field Duplic.
of CNA52

Lab Name: NYTEST ENV INC

Contract: 9320437

Lab Code: NYTEST

Case No.: 20899

SAS No.: _____

SDG No.: CNA51

Matrix: (soil/water) WATER

Lab Sample ID: 1837908

Sample wt/vol: 5.0 (g/mL) ML

Lab File ID: N3103

Level: (low/med) LOW

Date Received: 09/30/93

% Moisture: not dec. _____

Date Analyzed: 10/07/93

GC column: CAP ID: 0.530 (mm)

Dilution Factor: 1.0

Soil Extract Volume: _____ (uL)

Soil Aliquot Volume: _____ (uL)

CONCENTRATION UNITS:

CAS NO.

COMPOUND

(ug/L or ug/Kg) UG/L

Q

74-87-3	Chloromethane	10	U
74-83-9	Bromomethane	10	U
75-01-4	Vinyl Chloride	10	U
75-00-3	Chloroethane	10	U
75-09-2	Methylene Chloride	2300* B	U
67-64-1	Acetone	10	U
75-15-0	Carbon Disulfide	10	U
75-35-4	1,1-Dichloroethane	210* J 1000	U
75-34-3	1,1-Dichloroethane	360 J 2	U
540-59-0	1,2-Dichloroethane (total)	1100* J 300	U
67-66-3	Chloroform	6 B 2	U
107-06-2	1,2-Dichloroethane	10	U
78-93-3	2-Butanone	10	U
71-55-6	1,1,1-Trichloroethane	35000* 10000	U
56-23-5	Carbon Tetrachloride	10	U
75-27-4	Bromodichloromethane	10	U
78-67-5	1,2-Dichloropropane	10	U
10061-01-5	cis-1,3-Dichloropropene	10	U
79-01-6	1,1,2-Trichloroethane	29000* 3000	U
124-48-1	Dibromochloromethane	10	U
79-00-6	1,1,2-Trichloroethane	26	U
71-43-2	Benzene	10	U
10061-02-6	trans-1,3-Dichloropropene	10	U
75-25-2	Bromoform	10	U
108-10-1	4-Methyl-2-Pentanone	10	U
591-78-6	2-Hexanone	10	U
127-18-4	Tetrachloroethane	55	U
79-34-5	1,1,2,2-Tetrachloroethane	10	U
108-88-3	Toluene	9 J	U
108-90-7	Chlorobenzene	10	U
100-41-4	Ethylbenzene	10	U
100-42-5	Styrene	10	U
1330-20-7	Xylene (total)	10	U

* = Result Reported from Dilution

FORM I VOA

3/90

0000020

VOLATILE ORGANICS ANALYSIS DATA SHEET

Sample Location: BSP-MW-15

CNA55

Lab Name: NYTEST ENV INC

Contract: 9320437

Lab Code: NYTEST

Case No.: 20899

SAS No.: _____

SDG No.: CNA51

Matrix: (soil/water) WATER

Lab Sample ID: 1837906

Sample wt/vol: 5.0 (g/mL) ML

Lab File ID: N3101

Level: (low/med) LOW

Date Received: 09/30/93

% Moisture: not dec. _____

Date Analyzed: 10/07/93

GC Column: CAP ID: 0.530 (mm)

Dilution Factor: 1.0

Soil Extract Volume: _____ (uL)

Soil Aliquot Volume: _____ (uL)

CONCENTRATION UNITS:

CAS NO.

COMPOUND

(ug/L or ug/Kg) UG/L

Q

74-87-3	Chloromethane	10	U
74-83-9	Bromomethane	10	U
75-01-4	Vinyl Chloride	10	U
75-00-3	Chloroethane	10	U
75-09-2	Methylene Chloride	450* 8	U
67-64-1	Acetone	10	U
75-15-0	Carbon Disulfide	10	U
75-35-4	1,1-Dichloroethane	170* 3	2
75-34-3	1,1-Dichloroethane	30	2
540-59-0	1,2-Dichloroethane (total)	700* 3	2
67-66-3	Chloroform	10	U
107-06-2	1,2-Dichloroethane	10	U
78-93-3	2-Butanone	10	U
71-55-6	1,1,1-Trichloroethane	3700* 4000	2
56-23-5	Carbon Tetrachloride	10	U
75-27-4	Bromodichloromethane	10	U
79-87-5	1,2-Dichloropropane	10	U
10061-01-5	cis-1,3-Dichloropropene	10	U
79-01-6	1,1,2-Trichloroethane	13000* 1400	2
124-48-1	Dibromochloromethane	10	U
79-00-2	1,1,2-Trichloroethane	12	U
71-43-2	Benzene	10	U
10061-02-6	trans-1,3-Dichloropropene	10	U
75-25-2	Bromoform	10	U
108-10-1	4-Methyl-2-Pentanone	10	U
591-78-6	2-Hexanone	10	U
127-18-4	Tetrachloroethane	15	U
79-34-5	1,1,2,2-Tetrachloroethane	10	U
108-88-3	Toluene	1	U
108-90-7	Chlorobenzene	10	U
100-41-4	Ethylbenzene	10	U
100-42-5	Styrene	10	U
1330-20-7	Xylene (total)	10	U

EL
12/13/93

0000024

* = Result Reported from Dilution

VOLATILE ORGANICS ANALYSIS DATA SHEET

Sample Location: BSP-MW-16

CNA56

Lab Name: NYTEST ENV INC

Contract: 9320437

ORIGINAL
(Red)

Code: NYTEST

Case No.: 20899

SAS No.: _____

SDG No.: CNA51

Matrix: (soil/water) WATER

Lab Sample ID: 1837907

Sample wt/vol: 5.0 (g/mL) ML

Lab File ID: N3102

Level: (low/med) LOW

Date Received: 09/30/93

% Moisture: not dec. _____

Date Analyzed: 10/07/93

GC Column: CAP ID: 0.530 (mm)Dilution Factor: 1.0

Soil Extract Volume: _____ (uL)

Soil Aliquot Volume: _____ (uL)

CONCENTRATION UNITS:

CAS NO.

COMPOUND

(ug/L or ug/Kg) UG/L

Q

74-87-3	Chloromethane	10	U
74-83-9	Bromomethane	10	U
75-01-4	Vinyl Chloride	10	U
75-00-3	Chloroethane	6	J
75-09-2	Methylene Chloride	4	EL
67-64-1	Acetone	10	U
75-15-0	Carbon Disulfide	10	U
75-35-4	1,1-Dichloroethane	270	J
75-34-3	1,1-Dichloroethane	73	J
540-59-0	1,2-Dichloroethane (total)	180	J
67-66-3	Chloroform	10	U
107-06-2	1,2-Dichloroethane	10	U
78-93-3	2-Butanone	10	U
71-55-6	1,1,1-Trichloroethane	4200	J
56-23-5	Carbon Tetrachloride	10	U
75-27-4	Bromodichloromethane	10	U
78-37-5	1,2-Dichloropropane	10	U
10061-01-5	cis-1,3-Dichloropropene	10	U
79-03-6	1,1,2-Trichloroethane	3700	J
124-48-1	Dibromochloromethane	10	U
79-00-5	1,1,2-Trichloroethane	10	U
71-43-2	Benzene	10	U
10061-02-6	trans-1,3-Dichloropropene	10	U
75-25-2	Bromoform	10	U
108-10-1	4-Methyl-2-Pentanone	10	U
591-78-6	2-Hexanone	10	U
127-18-4	Tetrachloroethane	7	J
79-34-5	1,1,2,2-Tetrachloroethane	10	U
108-88-3	Toluene	10	U
108-90-7	Chlorobenzene	10	U
100-41-4	Ethylbenzene	10	U
100-42-5	Styrene	10	U
1330-20-7	Xylene (total)	10	U

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12/10/93EL
12/10/93

0000028

* = Result Reported from Dilution

VOLATILE ORGANICS ANALYSIS DATA SHEET

Sample Location: BSP-SW-01

CNA57

Lab Name: NYTEST ENV INC

Contract: 9320437

Lab Code: NYTEST

Case No.: 20899

SAS No.: _____

SDG No.: CNA51

Matrix: (soil/water) WATER

Lab Sample ID: 1837909

Sample wt/vol: 5.0 (g/mL) mL

Lab File ID: N3104

Level: (low/med) LOW

Date Received: 09/30/93

% Moisture: not dec. _____

Date Analyzed: 10/07/93

GC Column: CAP ID: 0.530 (mm)

Dilution Factor: 1.0

Soil Extract Volume: _____ (uL)

Soil Aliquot Volume: _____ (uL)

CONCENTRATION UNITS:

CAS NO.

COMPOUND

(ug/L or ug/Kg) UG/L

Q

74-87-3	-----Chloromethane	10	U
74-83-9	-----Bromomethane	10	U
75-01-4	-----Vinyl Chloride	10	U
75-00-3	-----Chloroethane	10	U
75-09-2	-----Methylene Chloride	3	38
67-64-1	-----Acetone	7	38
75-15-0	-----Carbon Disulfide	10	U
75-35-4	-----1,1-Dichloroethene	10	U
75-34-3	-----1,1-Dichloroethane	10	U
540-59-0	-----1,2-Dichloroethene (total)	10	U
67-66-3	-----Chloroform	10	U
107-06-2	-----1,2-Dichloroethane	10	U
78-93-3	-----2-Butanone	10	U
71-55-6	-----1,1,1-Trichloroethane	5	3
56-23-5	-----Carbon Tetrachloride	10	U
75-27-4	-----Bromodichloromethane	10	U
78-37-5	-----1,2-Dichloropropane	10	U
10061-01-5	-----cis-1,3-Dichloropropene	10	U
79-01-6	-----Trichloroethene	9	3
124-48-1	-----Dibromochloromethane	10	U
79-00-5	-----1,1,2-Trichloroethane	10	U
71-43-2	-----Benzene	10	U
10061-02-6	-----trans-1,3-Dichloropropene	10	U
75-25-2	-----Bromoform	10	U
108-10-1	-----4-Methyl-2-Pentanone	10	U
591-78-6	-----2-Hexanone	10	U
127-18-4	-----Tetrachloroethene	10	U
79-34-5	-----1,1,2,2-Tetrachloroethane	10	U
108-88-3	-----Toluene	10	U
108-90-7	-----Chlorobenzene	10	U
100-41-4	-----Ethylbenzene	10	U
100-42-5	-----Styrene	10	U
1330-20-7	-----Xylene (total)	10	U

EL
12/10/93

0000032

VOLATILE ORGANICS ANALYSIS DATA SHEET

Sample Location: BSP-SW-03

CNA58

Lab Name: NYTEST ENV INC

Contract: 9320437

Lab Code: NYTEST Case No.: 20899 SAS No.: SDG No.: CNA51

Matrix: (soil/water) WATER

Lab Sample ID: 1837911

Sample wt/vol: 5.0 (g/mL) ML

Lab File ID: N3106

Level: (low/med) LOW

Date Received: 09/30/93

% Moisture: not dec.

Date Analyzed: 10/07/93

GC Column: CAP ID: 0.530 (mm)

Dilution Factor: 1.0

Soil Extract Volume: (uL)

Soil Aliquot Volume: (uL)

CONCENTRATION UNITS:

CAS NO.

COMPOUND

(ug/L or ug/Kg) UG/L

Q

74-87-3	Chloromethane	10	U
74-83-9	Bromomethane	10	U
75-01-4	Vinyl Chloride	10	U
75-00-3	Chloroethane	10	U
75-09-2	Methylene Chloride	4	U
67-64-1	Acetone	10	U
75-15-0	Carbon Disulfide	10	U
75-35-4	1,1-Dichloroethene	10	U
75-34-3	1,1-Dichloroethane	10	U
540-59-0	1,2-Dichloroethene (total)	7	U
67-66-3	Chloroform	10	U
107-06-2	1,2-Dichloroethane	10	U
78-93-3	2-Butanone	10	U
71-55-6	1,1,1-Trichloroethane	2	U
56-23-5	Carbon Tetrachloride	10	U
75-27-4	Bromodichloromethane	10	U
78-87-5	1,2-Dichloropropane	10	U
10061-01-5	cis-1,3-Dichloropropene	10	U
79-01-6	Trichloroethene	21	U
124-48-1	Dibromochloromethane	10	U
79-00-5	1,1,2-Trichloroethane	10	U
71-43-2	Benzene	10	U
10061-02-6	trans-1,3-Dichloropropene	10	U
75-25-2	Bromoform	10	U
108-10-1	4-Methyl-2-Pentanone	10	U
591-78-6	2-Hexanone	10	U
127-18-4	Tetrachloroethene	10	U
79-34-5	1,1,2,2-Tetrachloroethane	10	U
108-88-3	Toluene	10	U
108-90-7	Chlorobenzene	10	U
100-41-4	Ethylbenzene	10	U
100-42-5	Styrene	10	U
1330-20-7	Xylene (total)	10	U

EL
12/14/93

0000034

VOLATILE ORGANICS ANALYSIS DATA SHEET

Sample Location: BSP-SW-02

CNA59

Lab Name: NYTEST ENV INC Contract: 9320437

Lab Code: NYTEST Case No.: 00899 SAS No.: SDG No.: CNA51

Matrix: (soil/water) WATER Lab Sample ID: 1837910

Sample wt/vol: 5.0 (g/mL) mL Lab File ID: N3105

Level: (low/med) LOW Date Received: 09/30/93

% Moisture: not dec. Date Analyzed: 10/07/93

GC column: CAP ID: 0.530 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

CONCENTRATION UNITS:

CAS NO. COMPOUND (ug/L or ug/Kg) UG/L Q

74-87-3	Chloromethane	10	U
74-83-9	Bromomethane	10	U
75-01-4	Vinyl Chloride	10	U
75-00-3	Chloroethane	10	U
75-09-2	Methylene Chloride	3	37
67-64-1	Acetone	9	28
75-15-0	Carbon Disulfide	10	U
75-35-4	1,1-Dichloroethene	10	U
75-34-3	1,1-Dichloroethane	10	U
540-59-0	1,2-Dichloroethane (total)	10	U
67-66-3	Chloroform	10	U
107-06-2	1,2-Dichloroethane	10	U
78-93-3	2-Butanone	10	U
71-55-6	1,1,1-Trichloroethane	10	U
56-23-5	Carbon Tetrachloride	10	U
75-27-4	Bromodichloromethane	10	U
78-97-5	1,2-Dichloropropane	10	U
10061-01-5	cis-1,3-Dichloropropene	10	U
79-01-6	Trichloroethene	5	U
124-48-1	Dibromochloromethane	10	U
79-00-5	1,1,2-Trichloroethane	10	U
71-43-2	Benzene	10	U
10061-02-6	trans-1,3-Dichloropropene	10	U
75-25-2	Bromoform	10	U
108-10-1	4-Methyl-2-Pentanone	10	U
591-78-6	2-Hexanone	10	U
127-18-4	Tetrachloroethene	10	U
79-34-5	1,1,2,2-Tetrachloroethane	10	U
108-88-3	Toluene	10	U
108-90-7	Chlorobenzene	10	U
100-41-4	Ethylbenzene	10	U
100-42-5	Styrene	10	U
1330-20-7	Xylene (total)	10	U

EL
12/13/93

0000036

VOLATILE ORGANICS ANALYSIS DATA SHEET

Sample Location: BSP-FB-01

CNA60

Field
BlankORIGINAL
(Red)

Lab Name: NYTEST ENV INC

Contract: 9320437

Lab Code: NYTEST

Case No.: 20899

SAS No.: _____

SDG No.: CNA51

Matrix: (soil/water) WATER

Lab Sample ID: 1837912

Sample wt/vol: 5.0 (g/mL) ML

Lab File ID: N3107

Level: (low/med) LOW

Date Received: 09/30/93

% Moisture: not dec. _____

Date Analyzed: 10/08/93

GC Column: CAP ID: 0.530 (mm)

Dilution Factor: 1.0

Soil Extract Volume: _____ (uL)

Soil Aliquot Volume: _____ (uL)

CONCENTRATION UNITS:

CAS NO.

COMPOUND

(ug/L or ug/Kg) UG/L

Q

74-87-3	Chloromethane	10	U
74-83-9	Bromomethane	10	U
75-01-4	Vinyl Chloride	10	U
75-00-3	Chloroethane	10	U
75-09-2	Methylene Chloride	5	28
67-64-1	Acetone	6	28
75-15-0	Carbon Disulfide	10	U
75-35-4	1,1-Dichloroethane	10	U
75-34-3	1,1-Dichloroethane	10	U
540-59-0	1,2-Dichloroethane (total)	10	U
67-66-3	Chloroform	27	8
107-06-2	1,2-Dichloroethane	10	U
78-93-3	2-Butanone	10	U
71-55-6	1,1,1-Trichloroethane	10	U
56-23-5	Carbon Tetrachloride	10	U
75-27-4	Bromodichloromethane	4	U
78-27-5	1,2-Dichloropropane	10	U
10061-01-5	cis-1,3-Dichloropropene	10	U
79-01-6	Trichloroethene	10	U
124-48-1	Dibromochloromethane	10	U
79-00-5	1,1,2-Trichloroethane	10	U
71-43-2	Benzene	10	U
10061-02-6	trans-1,3-Dichloropropene	10	U
75-25-2	Bromoform	10	U
108-10-1	4-Methyl-2-Pentanone	10	U
591-78-6	2-Hexanone	10	U
127-18-4	Tetrachloroethene	10	U
79-34-5	1,1,2,2-Tetrachloroethane	10	U
108-88-3	Toluene	10	U
108-90-7	Chlorobenzene	10	U
100-41-4	Ethylbenzene	10	U
100-42-5	Styrene	10	U
1330-20-7	Xylene (total)	10	U

EL
12/13/93EL
12/14/93

0000038

Level MZ Review

LA

EPA SAMPLE NO.

VOLATILE ORGANICS ANALYSIS DATA SHEET

Sample Location: BSP-TB-01

CNA97

Trip
Blank

Lab Name: NYTEST ENV INC

Contract: 9320437

Lab Code: NYTEST

Case No.: 20899

SAS No.: _____

SDG No.: CNA51

Matrix: (soil/water) WATER

Lab Sample ID: 1837913

Sample wt/vol: 5.0 (g/mL) ML

Lab File ID: N3108

Level: (low/med) LOW

Date Received: 09/30/93

% Moisture: not dec. _____

Date Analyzed: 10/08/93

GC Column: CAP ID: 0.530 (mm)

Dilution Factor: 1.0

Soil Extract Volume: _____ (uL)

Soil Aliquot Volume: _____ (uL)

CONCENTRATION UNITS:

CAS NO.

COMPOUND

(ug/L or ug/Kg) UG/L

Q

74-87-3	Chloromethane	10	U
74-83-9	Bromomethane	10	U
75-01-4	Vinyl Chloride	10	U
75-00-3	Chloroethane	10	U
75-09-2	Methylene Chloride	5	U
67-64-1	Acetone	10	U
75-15-0	Carbon Disulfide	10	U
75-35-4	1,1-Dichloroethene	10	U
75-34-3	1,1-Dichloroethane	10	U
540-59-0	1,2-Dichloroethene (total)	10	U
67-66-3	Chloroform	30	U
107-06-2	1,2-Dichloroethane	10	U
78-93-3	2-Butanone	10	U
71-55-6	1,1,1-Trichloroethane	10	U
56-23-5	Carbon Tetrachloride	10	U
75-27-4	Bromodichloromethane	4	U
78-87-5	1,2-Dichloropropane	10	U
10061-01-5	cis-1,3-Dichloropropene	10	U
79-01-6	Trichloroethene	10	U
124-48-1	Dibromochloromethane	10	U
79-00-5	1,1,2-Trichloroethane	10	U
71-43-2	Benzene	10	U
10061-02-6	trans-1,3-Dichloropropene	10	U
75-25-2	Bromoform	10	U
108-10-1	4-Methyl-2-Pentanone	10	U
591-78-6	2-Hexanone	10	U
127-18-4	Tetrachloroethene	10	U
79-34-5	1,1,2,2-Tetrachloroethane	10	U
108-88-3	Toluene	10	U
108-90-7	Chlorobenzene	10	U
100-41-4	Ethylbenzene	10	U
100-42-5	Styrene	10	U
1330-20-7	Xylene (total)	10	U

EL
12/13/93

0000048

upstream

VOLATILE ORGANICS ANALYSIS DATA SHEET

Sample Location: BSP-SED-01

CNA61

ORIGINAL
(Red)

Lab Name: NYTEST ENV INC

Contract: 9320437

Lab Code: NYTEST Case No.: 20899 SAS No.: _____ SDG No.: CNA51

Matrix: (soil/water) SOIL

Lab Sample ID: 1837914

Sample wt/vol: 5.0 (g/mL) G

Lab File ID: N3070

Level: (low/med) LOW

Date Received: 09/30/93

% Moisture: not dec. 26

Date Analyzed: 10/06/93

GC Column: CAP ID: 0.530 (mm)

Dilution Factor: 1.0

Soil Extract Volume: _____ (uL)

Soil Aliquot Volume: _____ (uL)

CONCENTRATION UNITS:

CAS NO.

COMPOUND

(ug/L or ug/Kg) UG/KG

Q

74-87-3	Chloromethane	14	U
74-83-9	Bromomethane	14	U
75-01-4	Vinyl Chloride	14	U
75-00-3	Chloroethane	14	U
75-09-2	Methylene Chloride	11	3.7
67-64-1	Acetone	14	UJ
75-15-0	Carbon Disulfide	14	U
75-35-4	1,1-Dichloroethene	14	U
75-34-3	1,1-Dichloroethane	14	U
540-59-0	1,2-Dichloroethene (total)	14	U
67-66-3	Chloroform	14	U
107-06-2	1,2-Dichloroethane	14	U
78-93-3	2-Butanone	14	UJ
71-55-6	1,1,1-Trichloroethane	14	U
56-23-5	Carbon Tetrachloride	14	U
75-27-4	Bromodichloromethane	14	U
78-87-5	1,2-Dichloropropane	14	U
10061-01-5	cis-1,3-Dichloropropene	14	U
79-01-6	Trichloroethane	14	U
124-48-1	Dibromochloromethane	14	U
79-00-5	1,1,2-Trichloroethane	14	U
71-43-2	Benzene	14	U
10061-02-6	trans-1,3-Dichloropropene	14	U
75-25-2	Bromoform	14	U
108-10-1	4-Methyl-2-Pentanone	14	UJ
591-78-6	2-Hexanone	14	UJ
127-18-4	Tetrachloroethene	14	U
79-34-5	1,1,2,2-Tetrachloroethane	14	U
108-88-3	Toluene	14	U
108-90-7	Chlorobenzene	14	U
100-41-4	Ethylbenzene	14	U
100-42-5	Styrene	14	U
1330-20-7	Xylene (total)	14	U

EL
12/13/93

0000040

VOLATILE ORGANICS ANALYSIS DATA SHEET

Sample Location: BSP-SED-02

CNA62

Field Duplic.
of CNA64

Lab Name: NYTEST ENV INC

Contract: 9320437

Lab Code: NYTEST

Case No.: 20899

SAS No.: _____

SDG No.: CNA51

Matrix: (soil/water) SOIL

Lab Sample ID: 1837915

Sample wt/vol: 5.0 (g/mL) G

Lab File ID: N3071

Level: (low/med) LOW

Date Received: 09/30/93

% Moisture: not dec. 27

Date Analyzed: 10/06/93

GC column: CAP ID: 0.530 (mm)

Dilution Factor: 1.0

Soil Extract Volume: _____ (uL)

Soil Aliquot Volume: _____ (uL)

CONCENTRATION UNITS:

CAS NO.

COMPOUND

(ug/L or ug/Kg) UG/KG

Q

74-87-3	Chloromethane	14	U
74-83-9	Bromomethane	14	U
75-01-4	Vinyl Chloride	14	U
75-00-3	Chloroethane	14	U
75-09-2	Methylene Chloride	4	37
67-64-1	Acetone	14	U
75-15-0	Carbon Disulfide	14	U
75-35-4	1,1-Dichloroethene	14	U
75-34-3	1,1-Dichloroethane	14	U
540-59-0	1,2-Dichloroethene (total)	14	U
67-66-3	Chloroform	14	U
107-06-2	1,2-Dichloroethane	14	U
78-93-3	2-Butanone	14	UJ
71-55-6	1,1,1-Trichloroethane	14	U
56-23-5	Carbon Tetrachloride	14	U
75-27-4	Bromodichloromethane	14	U
78-87-5	1,2-Dichloropropane	14	U
10061-01-5	cis-1,3-Dichloropropene	14	U
79-01-6	Trichloroethene	14	U
124-48-1	Dibromochloromethane	14	U
79-00-5	1,1,2-Trichloroethane	14	U
71-43-2	Benzene	14	U
10061-02-6	trans-1,3-Dichloropropene	14	U
75-25-2	Bromoform	14	U
108-10-1	4-Methyl-2-Pentanone	14	UJ
591-78-6	2-Hexanone	14	UJ
127-18-4	Tetrachloroethene	14	U
79-34-5	1,1,2,2-Tetrachloroethane	14	U
108-88-3	Toluene	14	U
108-90-7	Chlorobenzene	14	U
100-41-4	Ethylbenzene	14	U
100-42-5	Styrene	14	U
1330-20-7	Xylene (total)	14	U

EL
12/13/93

0000042

VOLATILE ORGANICS ANALYSIS DATA SHEET

Sample Location: BSP-SED-03

CNA63

Field Duplicate ^{EL}
of CNA63 12/23/93ORIGINAL
(Red)

Lab Name: NYTEST ENV INC

Contract: 9320437

Lab Code: NYTEST

Case No.: 20999

SAS No.: _____

SDG No.: CNA51

Matrix: (soil/water) SOILLab Sample ID: 1837916Sample wt/vol: 5.0 (g/mL) GLab File ID: N3072Level: (low/med) LOWDate Received: 09/30/93% Moisture: not dec. 20Date Analyzed: 10/06/93GC Column: CAP ID: 0.530 (mm)Dilution Factor: 1.0

Soil Extract Volume: _____ (uL)

Soil Aliquot Volume: _____ (uL)

CONCENTRATION UNITS:

CAS NO.

COMPOUND

(ug/L or ug/Kg) UG/KG

Q

74-87-3	Chloromethane	12	U
74-83-9	Bromomethane	12	U
75-01-4	Vinyl Chloride	12	U
75-00-3	Chloroethane	12	U
75-09-2	Methylene Chloride	4	3/
67-64-1	Acetone	12	UJ
75-15-0	Carbon Disulfide	12	U
75-35-4	1,1-Dichloroethene	12	U
75-34-3	1,1-Dichloroethane	12	U
540-59-0	1,2-Dichloroethene (total)	12	U
67-66-3	Chloroform	12	U
107-06-2	1,2-Dichloroethane	12	U
78-93-3	2-Butanone	12	UJ
71-55-6	1,1,1-Trichloroethane	12	U
56-23-5	Carbon Tetrachloride	12	U
75-27-4	Bromodichloromethane	12	U
78-27-3	1,2-Dichloropropane	12	U
10061-01-3	cis-1,3-Dichloropropene	12	U
79-01-6	Trichloroethene	12	U
124-48-1	Dibromochloromethane	12	U
79-00-5	1,1,2-Trichloroethane	12	U
71-43-2	Benzene	12	U
10061-02-6	trans-1,3-Dichloropropene	12	U
75-25-2	Bromoform	12	U
108-10-1	4-Methyl-2-Pentanone	12	UJ
591-78-6	2-Hexanone	12	UJ
127-18-4	Tetrachloroethene	12	U
79-34-5	1,1,2,2-Tetrachloroethane	12	U
108-88-3	Toluene	12	U
108-90-7	Chlorobenzene	12	U
100-41-4	Ethylbenzene	12	U
100-42-5	Styrene	12	U
1330-20-7	Xylene (total)	12	U

EL
12/13/93

0000044

Level MZ Review

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

EAL 12/10/93

Sample Location: BSP-SE0-04

CNA57

Field Duplicate
of CNA63 ^{EL}
12/21/93
CNA62

Lab Name: NYTEST ENV INC

Contract: 9320437

Lab Code: NYTEST

Case No.: 20899

SAS No.: _____

SDG No.: CNA51

Matrix: (soil/water) SOIL

Lab Sample ID: 1837919

Sample wt/vol: 5.0 (g/mL) G

Lab File ID: N3075

Level: (low/med) LOW

Date Received: 09/30/93

% Moisture: not dec. 22

Date Analyzed: 10/06/93

GC Column: CAP ID: 0.530 (mm)

Dilution Factor: 1.0

Soil Extract Volume: _____ (uL)

Soil Aliquot Volume: _____ (uL)

CONCENTRATION UNITS:

CAS NO.

COMPOUND

(ug/L or ug/Kg) UG/KG

Q

74-87-3	Chloromethane	13	U
74-83-9	Bromomethane	13	U
75-01-4	Vinyl Chloride	13	U
75-00-3	Chloroethane	13	U
75-09-2	Methylene Chloride	4	BJ
67-64-1	Acetone	13	UJ
75-15-0	Carbon Disulfide	13	U
75-35-4	1,1-Dichloroethene	13	U
75-34-3	1,1-Dichloroethane	13	U
540-59-0	1,1-Dichloroethene (total)	13	U
67-66-3	Chloroform	13	U
107-06-2	1,1-Dichloroethane	13	U
78-93-3	2-Butanone	13	UJ
71-55-6	1,1,1-Trichloroethane	13	U
56-23-5	Carbon Tetrachloride	13	U
75-27-4	Bromodichloromethane	13	U
78-37-5	1,2-Dichloropropane	13	U
10061-01-5	cis-1,3-Dichloropropene	13	U
79-01-6	Trichloroethene	2	J
124-48-1	Dibromochloromethane	13	U
79-00-5	1,1,2-Trichloroethane	13	U
71-43-2	Benzene	13	U
10061-02-6	trans-1,3-Dichloropropene	13	U
75-25-2	Bromoform	13	U
108-10-1	4-Methyl-2-Pentanone	13	UJ
591-78-6	2-Hexanone	13	UJ
127-18-4	Tetrachloroethene	13	U
79-34-5	1,1,2,2-Tetrachloroethane	13	U
108-88-3	Toluene	13	U
108-90-7	Chlorobenzene	13	U
100-41-4	Ethylbenzene	13	U
100-42-5	Styrene	13	U
1330-20-7	Xylene (total)	13	U

EL
12/13/93

0000046

VOLATILE ORGANICS ANALYSIS DATA SHEET

Sample Location: BSP-MW-02

CNA52DL

LAB

Lab Name: NYTEST ENV INC

Contract: 9320437

Lab Code: NYTEST Case No.: 20899 SAS No.: SDG No.: CNA51

Matrix: (soil/water) WATER

Lab Sample ID: 1837902

Sample wt/vol: 5.0 (g/mL) ML

Lab File ID: N3120

Level: (low/med) LOW

Date Received: 09/30/93

% Moisture: not dec.

Date Analyzed: 10/08/93

GC Column: CAP ID: 0.530 (mm)

Dilution Factor: 500.0

Soil Extract Volume: (uL)

Soil Aliquot Volume: (uL)

CONCENTRATION UNITS:

CAS NO.

COMPOUND

(ug/L or ug/Kg) UG/L

Q

74-87-3-----	Chloromethane	5000	U
74-83-9-----	Bromomethane	5000	U
75-01-4-----	Vinyl Chloride	5000	U
75-00-3-----	Chloroethane	5000	U
75-09-2-----	Methylene Chloride	2800	BDJ
67-64-1-----	Acetone	5000	U
75-15-0-----	Carbon Disulfide	5000	U
75-35-4-----	1,1-Dichloroethene	590	DJ
75-34-3-----	1,1-Dichloroethane	5000	U
540-59-0-----	1,2-Dichloroethene (total)	1000	DJ
67-66-3-----	Chloroform	5000	U
107-06-2-----	1,2-Dichloroethane	5000	U
78-93-3-----	2-Butanone	5000	U
71-55-6-----	1,1,1-Trichloroethane	30000	D
56-23-5-----	Carbon Tetrachloride	5000	U
75-27-4-----	Bromodichloromethane	5000	U
75-87-5-----	1,2-Dichloropropane	5000	U
10061-01-5-----	cis-1,3-Dichloropropene	5000	U
79-01-6-----	Trichloroethene	25000	D
124-48-1-----	Dibromochloromethane	5000	U
79-00-5-----	1,1,2-Trichloroethane	5000	U
71-43-2-----	Benzene	5000	U
10061-02-6-----	trans-1,3-Dichloropropene	5000	U
75-25-2-----	Bromoform	5000	U
108-10-1-----	4-Methyl-2-Pentanone	5000	U
591-78-6-----	2-Hexanone	5000	U
127-18-4-----	Tetrachloroethene	5000	U
79-34-5-----	1,1,2,2-Tetrachloroethane	5000	U
108-88-3-----	Toluene	5000	U
108-90-7-----	Chlorobenzene	5000	U
100-41-4-----	Ethylbenzene	5000	U
100-42-5-----	Styrene	5000	U
1330-20-7-----	Xylene (total)	5000	U

00.00014

VOLATILE ORGANICS ANALYSIS DATA SHEET

Sample Location: BSP-MW-03

CNA53DL

Lab Name: NYTEST ENV INC

Contract: 9320437

Lab Code: NYTEST

Case No.: 20899

SAS No.:

SDG No.: CNA51

Matrix: (soil/water) WATER

Lab Sample ID: 1837903

Sample wt/vol: 5.0 (g/mL) ML

Lab File ID: N3116

Level: (low/med) LOW

Date Received: 09/30/93

% Moisture: not dec.

Date Analyzed: 10/08/93

GC Column: CAP ID: 0.530 (mm)

Dilution Factor: 100.0

Soil Extract Volume: (uL)

Soil Aliquot Volume: (uL)

CONCENTRATION UNITS:

CAS NO. COMPOUND (ug/L or ug/Kg) UG/L Q

74-87-3	Chloromethane	1000	U
74-83-9	Bromomethane	1000	U
75-01-4	Vinyl Chloride	1000	U
75-00-3	Chloroethane	1000	U
75-09-2	Methylene Chloride	480	BDJ
67-64-1	Acetone	1000	U
75-15-0	Carbon Disulfide	1000	U
75-35-4	1,1-Dichloroethene	1000	U
75-34-3	1,1-Dichloroethane	1000	U
540-59-0	1,2-Dichloroethene (total)	560	DJ
67-66-3	Chloroform	1000	U
107-06-2	1,2-Dichloroethane	1000	U
78-93-3	2-Butanone	1000	U
71-55-6	1,1,1-Trichloroethane	790	DJ
56-23-5	Carbon Tetrachloride	1000	U
75-27-4	Bromodichloromethane	1000	U
76-87-5	1,2-Dichloropropane	1000	U
10061-01-5	cis-1,3-Dichloropropene	1000	U
79-01-6	Trichloroethene	13000	D
124-48-1	Dibromochloromethane	1000	U
79-00-5	1,1,2-Trichloroethane	1000	U
71-43-2	Benzene	1000	U
10061-02-6	trans-1,3-Dichloropropene	1000	U
75-25-2	Bromoform	1000	U
108-10-1	4-Methyl-2-Pentanone	1000	U
591-78-6	2-Hexanone	1000	U
127-18-4	Tetrachloroethene	1000	U
79-34-5	1,1,2,2-Tetrachloroethane	1000	U
108-88-3	Toluene	1000	U
108-90-7	Chlorobenzene	1000	U
100-41-4	Ethylbenzene	1000	U
100-42-5	Styrene	1000	U
1330-20-7	Xylene (total)	1000	U

0000018

VOLATILE ORGANICS ANALYSIS DATA SHEET

Sample Location: BSP-MW-21

CNA54DL

Lab Name: NYTEST ENV INC

Contract: 9320437

Lab Code: NYTEST

Case No.: 20899

SAS No.: _____

SDG No.: CNA51

Matrix: (soil/water) WATER

Lab Sample ID: 1237908

Sample wt/vol: 5.0 (g/mL) ML

Lab File ID: N3121

Level: (low/med) LOW

Date Received: 09/30/93

% Moisture: not dec. _____

Date Analyzed: 10/08/93

GC Column: CAP ID: 0.530 (mm)

Dilution Factor: 500.0

Soil Extract Volume: _____ (uL)

Soil Aliquot Volume: _____ (uL)

CONCENTRATION UNITS:

CAS NO.

COMPOUND

(ug/L or ug/Kg) UG/L

Q

74-87-3	-----Chloromethane	5000	U
74-83-9	-----Bromomethane	5000	U
75-01-4	-----Vinyl Chloride	5000	U
75-00-3	-----Chloroethane	5000	U
75-09-2	-----Methylene Chloride	2300	EDJ
67-64-1	-----Acetone	5000	U
75-15-0	-----Carbon Disulfide	5000	U
75-35-4	-----1,1-Dichloroethene	500	DC
75-34-3	-----1,1-Dichloroethane	5000	U
540-59-0	-----1,2-Dichloroethene (total)	1000	DC
67-66-3	-----Chloroform	5000	U
107-06-2	-----1,2-Dichloroethane	5000	U
76-93-3	-----2-Butanone	5000	U
71-55-6	-----1,1,1-Trichloroethane	35000	ED
56-23-5	-----Carbon Tetrachloride	5000	U
75-27-4	-----Bromodichloromethane	5000	U
78-07-5	-----1,2-Dichloropropane	5000	U
10061-01-5	-----cis-1,3-Dichloropropene	5000	U
79-01-6	-----Trichloroethene	29000	ED
124-48-1	-----Dibromochloromethane	5000	U
79-00-5	-----1,1,2-Trichloroethane	5000	U
71-43-2	-----Benzene	5000	U
10061-02-6	-----trans-1,3-Dichloropropene	5000	U
75-25-2	-----Bromoform	5000	U
108-10-1	-----4-Methyl-2-Pentanone	5000	U
591-78-6	-----2-Hexanone	5000	U
127-18-4	-----Tetrachloroethene	5000	U
79-34-5	-----1,1,2,2-Tetrachloroethane	5000	U
108-88-3	-----Toluene	5000	U
108-90-7	-----Chlorobenzene	5000	U
100-41-4	-----Ethylbenzene	5000	U
100-42-5	-----Styrene	5000	U
1330-20-7	-----Xylene (total)	5000	U

0000022

VOLATILE ORGANICS ANALYSIS DATA SHEET

Sample Location: BSP-MW-15

CNA55DL

Lab Name: NYTEST ENV INC

Contract: 9320437

Lab Code: NYTEST

Case No.: 20899

SAS No.:

SDG No.: CNA51

Matrix: (soil/water) WATER

Lab Sample ID: 1837906

Sample wt/vol: 5.0 (g/mL) ML

Lab File ID: N3117

Level: (low/med) LOW

Date Received: 09/30/93

% Moisture: not dec.

Date Analyzed: 10/08/93

GC Column: CAP ID: 0.530 (mm)

Dilution Factor: 100.0

Soil Extract Volume: (uL)

Soil Aliquot Volume: (uL)

CONCENTRATION UNITS:

CAS NO.

COMPOUND

(ug/L or ug/Kg) UG/L

Q

74-87-3	Chloromethane	1000	U
74-83-9	Bromomethane	1000	U
75-01-4	Vinyl Chloride	1000	U
75-00-3	Chloroethane	1000	U
75-09-2	Methylene Chloride	450	BDJ
67-64-1	Acetone	1000	U
75-15-0	Carbon Disulfide	1000	U
75-35-4	1,1-Dichloroethene	170	BDJ
75-34-3	1,1-Dichloroethane	1000	U
540-59-0	1,2-Dichloroethene (total)	700	BDJ
67-66-3	Chloroform	1000	U
107-06-2	1,2-Dichloroethane	1000	U
78-93-3	2-Butanone	1000	U
71-55-6	1,1,1-Trichloroethane	3700	D
56-23-5	Carbon Tetrachloride	1000	U
75-27-4	Bromodichloromethane	1000	U
78-27-5	1,2-Dichloropropane	1000	U
10061-01-5	cis-1,3-Dichloropropene	1000	U
79-01-6	Trichloroethene	13000	D
124-48-1	Dibromochloromethane	1000	U
79-00-5	1,1,2-Trichloroethane	1000	U
71-43-2	Benzene	1000	U
10061-02-6	trans-1,3-Dichloropropene	1000	U
75-25-2	Bromoform	1000	U
108-10-1	4-Methyl-2-Pentanone	1000	U
591-78-6	2-Hexanone	1000	U
127-18-4	Tetrachloroethene	1000	U
79-34-5	1,1,2,2-Tetrachloroethane	1000	U
108-88-3	Toluene	1000	U
106-90-7	Chlorobenzene	1000	U
100-41-4	Ethylbenzene	1000	U
100-42-5	Styrene	1000	U
1330-20-7	Xylene (total)	1000	U

0000026

ORIGINAL
(Red)

1A Level MZ Review

EPA SAMPLE NO.

VOLATILE ORGANICS ANALYSIS DATA SHEET

Sample Location: BSP-MW-16

CNA56DL

Lab Name: NYTEST ENV INC

Contract: 9320437

Lab Code: NYTEST

Case No.: 20899

SAS No.: _____

SDG No.: CNA51

Matrix: (soil/water) WATER

Lab Sample ID: 1837907

Sample wt/vol: 5.0 (g/mL) ML

Lab File ID: N3118

Level: (low/med) LOW

Date Received: 09/30/93

% Moisture: not dec. _____

Date Analyzed: 10/08/93

GC Column: CAP ID: 0.530 (mm)

Dilution Factor: 100.0

Soil Extract Volume: _____ (uL)

Soil Aliquot Volume: _____ (uL)

CONCENTRATION UNITS:

CAS NO.

COMPOUND

(ug/L or ug/Kg) UG/L

Q

74-87-3	Chloromethane	1000	U
74-83-9	Bromomethane	1000	U
75-01-4	Vinyl Chloride	1000	U
75-00-3	Chloroethane	1000	U
75-09-2	Methylene Chloride	450	BDJ
67-64-1	Acetone	1000	U
75-15-0	Carbon Disulfide	1000	U
75-35-4	1,1-Dichloroethene	1000	U
75-34-3	1,1-Dichloroethane	1000	U
540-59-0	1,2-Dichloroethene (total)	140	DJ
67-66-3	Chloroform	1000	U
107-06-2	1,2-Dichloroethane	1000	U
78-93-3	2-Butanone	1000	U
71-55-6	1,1,1-Trichloroethane	4200	D
56-23-5	Carbon Tetrachloride	1000	U
75-27-4	Bromodichloromethane	1000	U
78-37-5	1,2-Dichloroethene	1000	U
10061-01-5	cis-1,3-Dichloropropene	1000	U
79-01-6	Trichloroethane	3900	D
124-48-1	Dibromochloromethane	1000	U
79-00-5	1,1,2-Trichloroethane	1000	U
71-43-2	Benzene	1000	U
10061-02-6	trans-1,3-Dichloropropene	1000	U
75-25-2	Bromoform	1000	U
108-10-1	4-Methyl-2-Pentanone	1000	U
591-78-6	2-Hexanone	1000	U
127-18-4	Tetrachloroethene	1000	U
79-34-5	1,1,2,2-Tetrachloroethane	1000	U
108-88-3	Toluene	1000	U
108-90-7	Chlorobenzene	1000	U
100-41-4	Ethylbenzene	1000	U
100-42-5	Styrene	1000	U
1330-20-7	Xylene (total)	1000	U

0000030

1E
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

CNA51

Lab Name: NYTEST ENV INC Contract: 9320437

Lab Code: NYTEST Case No.: 20899 SAS No.: _____ SDG No.: CNA51

Matrix: (soil/water) WATER Lab Sample ID: 1837901

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: N3096

Level: (low/med) LOW Date Received: 09/30/93

% Moisture: not dec. _____ Date Analyzed: 10/07/93

GC Column: CAP ID: 0.530 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____ (uL) Soil Aliquot Volume: _____ (uL)

Number TICs found: 3
CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1. 1634044	Propane, 2-methoxy-2-methyl-	5.07	16	JN
2. 541059	Cyclotrisiloxane, hexamethyl	11.88	16	JN
3. 556672	Cyclotetrasiloxane, octamethyl	17.10	24	JN

EL
12/13/93

0000011

1E
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

CNA52

Lab Name: NYTEST ENV INC Contract: 9320437

Lab Code: NYTEST Case No.: 20899 SAS No.: _____ SDG No.: CNA51

Matrix: (soil/water) WATER Lab Sample ID: 1837902

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: N3097

Level: (low/med) LOW Date Received: 09/30/93

% Moisture: not dec. _____ Date Analyzed: 10/07/93

GC column: CAP ID: 0.530 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____ (uL) Soil Aliquot Volume: _____ (uL)

Number TICs found: 7 CONCENTRATION UNITS:
(ug/L or ug/Kg) 1

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1. 627190	1-Pentyne	3.72	4	JN
2. 76131	Ethane, 1,1,2-trichloro-1,2,	4.23	2000	JN
3. 541059	Cyclohexane, hexamethyl	11.89	11	JN
4.	Unknown	12.68	4	J
5. 556672	Cyclohexane, octameth	17.11	24	JN
6. 55429851	Benzeneethanamine, N-[(penta	21.30	12	JN
7. 42525600	Butane, 1,2,2,4-tetrachloro-	21.70	9	JN

EL
12/13/93

0000013

1E
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

CNA53

Lab Name: NYTEST ENV INC Contract: 9320437

Lab Code: NYTEST Case No.: 20899 SAS No.: _____ SDG No.: CNA51

Matrix: (soil/water) WATER Lab Sample ID: 1837903

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: N3098

Level: (low/med) LOW Date Received: 09/30/93

% Moisture: not dec. _____ Date Analyzed: 10/07/93

GC Column: CAP ID: 0.530 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____ (uL) Soil Aliquot Volume: _____ (uL)

Number TICs found: 6 CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1. 1634044	Propane, 2-methoxy-2-methyl-	5.09	90	JN
2.	Unknown	6.84	12	J
3. 541059	Cyclotrisiloxane, hexamethyl	11.88	25	JN
4.	Unknown	13.29	10	J
5. 556672	Cyclotetrasiloxane, octameth	17.10	46	JN
6. 55429851	Benzeneethanamine, N-[(penta	21.30	33	JN

EL
12/13/93

0000017

1E
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

CNA54

Lab Name: NYTEST ENV INC

Contract: 9320437

Lab Code: NYTEST

Case No.: 20899

SAS No.: _____

SDG No.: CNA51

Matrix: (soil/water) WATER

Lab Sample ID: 1837908

Sample wt/vol: 5.0 (g/mL) ML

Lab File ID: N3103

Level: (low/med) LOW

Date Received: 09/30/93

% Moisture: not dec. _____

Date Analyzed: 10/07/93

GC Column: CAP ID: 0.530 (mm)

Dilution Factor: 1.0

Soil Extract Volume: _____ (uL)

Soil Aliquot Volume: _____ (uL)

Number TICs found: 5
CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1. 76131	Ethane, 1,1,2-trichloro-1,2,	4.25	2100	JN
2. 541059	cyclotrisiloxane, hexamethyl	11.90	18	JN
3.	Unknown Siloxane	17.12	160	J
4. 55429851	Benzeneethanamine, N-[(penta	21.30	51	JN
5. 42525600	Butane, 1,2,2,4-tetrachloro-	21.70	10	JN

EL
12/13/93

0000021

1E
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

CNA55

Lab Name: NYTEST ENV INC

Contract: 9320437

Lab Code: NYTEST

Case No.: 20899

SAS No.: _____

SDG No.: CNA51

Matrix: (soil/water) WATER

Lab Sample ID: 1837906

Sample wt/vol: 5.0 (g/mL) ML

Lab File ID: N3101

Level: (low/med) LOW

Date Received: 09/30/93

% Moisture: not dec. _____

Date Analyzed: 10/07/93

GC Column: CAP ID: 0.530 (mm)

Dilution Factor: 1.0

Soil Extract Volume: _____ (uL)

Soil Aliquot Volume: _____ (uL)

CONCENTRATION UNITS:

Number TICs found: 4

(ug/L or ug/Kg) UG/L

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1. 76131	Ethane, 1,1,2-trichloro-1,2,	4.23	130	JN
2. 1634044	Propane, 2-methoxy-2-methyl-	5.09	73	JN
3. 541859	Cyclotrisiloxane, hexamethyl-	11.88	17	JN
4.	Unknown Siloxane	17.12	130	J

EL
12/13/93

0000025

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

CNA56

ORIGINAL
(Red)

Name: NYTEST ENV INC

Contract: 9320437

Lab Code: NYTEST

Case No.: 20899

SAS No.: _____

SDG No.: CNA51

Matrix: (soil/water) WATER

Lab Sample ID: 1837907

Sample wt/vol: 5.0 (g/mL) ML

Lab File ID: N3102

Level: (low/med) LOW

Date Received: 09/30/93

% Moisture: not dec. _____

Date Analyzed: 10/07/93

GC Column: CAP ID: 0.530 (mm)

Dilution Factor: 1.0

Soil Extract Volume: _____ (uL)

Soil Aliquot Volume: _____ (uL)

CONCENTRATION UNITS:

Number TICs found: 3

(ug/L or ug/Kg) UG/L

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1. 76131	Ethane, 1,1,2-trichloro-1,2,	4.24	130	JN
2. 55429293	Arsenous acid, tris(trimethy	11.86	7	JN
3. 556672	Cyclotetrasiloxane, octameth	17.11	47	JN

EL
12/13/93

0000029

1E
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

CNA57

Lab Name: NYTEST ENV INC Contract: 9320437

Lab Code: NYTEST Case No.: 20899 SAS No.: _____ SDG No.: CNA51

Matrix: (soil/water) WATER Lab Sample ID: 1837909

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: N3104

Level: (low/med) LOW Date Received: 09/30/93

% Moisture: not dec. _____ Date Analyzed: 10/07/93

GC Column: CAP ID: 0.530 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____ (uL) Soil Aliquot Volume: _____ (uL)

Number TICs found: 2 CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1. 541059	Cyclotrisiloxane, hexamethyl	11.88	12	JN
2. 556672	Cyclotetrasiloxane, octamethyl	17.11	140	JN

EL
12-13-93

0000033

1E
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

CNA58

Lab Name: NYTEST ENV INC Contract: 9320437

Lab Code: NYTEST Case No.: 20899 SAS No.: _____ SDG No.: CNA51

Matrix: (soil/water) WATER Lab Sample ID: 1837911

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: N3106

Level: (low/med) LOW Date Received: 09/30/93

% Moisture: not dec. _____ Date Analyzed: 10/07/93

GC Column: CAP ID: 0.530 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____ (uL) Soil Aliquot Volume: _____ (uL)

Number TICs found: 2 CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1. 541059	Cyclotrisiloxane, hexamethyl	11.89	24	JN
2.	Unknown Siloxane	17.12	160	J

EL
12/13/93

0000035

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

CVA59

Lab Name: NYTEST ENV INC Contract: 9320437Lab Code: NYTEST Case No.: 20899 SAS No.: _____ SDG No.: CVA51Matrix: (soil/water) WATER Lab Sample ID: 1937910Sample wt/vol: 5.0 (g/mL) ML Lab File ID: N3105Level: (low/med) LOW Date Received: 09/30/93% Moisture: not dec. _____ Date Analyzed: 10/07/93GC Column: CAP ID: 0.530 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____ (uL) Soil Aliquot Volume: _____ (uL)

CONCENTRATION UNITS:

Number TICs found: 2 (ug/L or ug/Kg) UG/L

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1. 541059	Cyclotrisiloxane, hexamethyl	11.67	17	JN
2. 556672	Cyclotetrasiloxane, octameth	17.11	250	JN

EL
12-13-93

0000037

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

CNA60

Field
BlankORIGINAL
Rec'd

Name: NYTEST ENV INC

Contract: 9320437

Lab Code: NYTEST

Case No.: 20899

SAS No.: _____

SDG No.: CNA51

Matrix: (soil/water) WATER

Lab Sample ID: 1837912

Sample wt/vol: 5.0 (g/mL) ML

Lab File ID: N3107

Level: (low/med) LOW

Date Received: 09/30/93

% Moisture: not dec. _____

Date Analyzed: 10/08/93

GC Column: CAP ID: 0.530 (mm)

Dilution Factor: 1.0

Soil Extract Volume: _____ (uL)

Soil Aliquot Volume: _____ (uL)

CONCENTRATION UNITS:

Number TICs found: 3

(ug/L or ug/Kg) UG/L

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1. 541059	Cyclotrisiloxane, hexamethyl	11.89	8	JW
2. 556672	Cyclotetrasiloxane, octameth	17.11	130	JW
3.	Unknown Siloxane	21.36	31	J

EL
12-13-93

0000039

1E
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

CNA97

Trip
Blank

Lab Name: NYTEST ENV INC Contract: 9320437

Lab Code: NYTEST Case No.: 20899 SAS No.: _____ SDG No.: CNA51

Matrix: (soil/water) WATER Lab Sample ID: 1837913

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: N3108

Level: (low/med) LOW Date Received: 09/30/93

% Moisture: not dec. _____ Date Analyzed: 10/08/93

GC Column: CAP ID: 0.530 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____ (uL) Soil Aliquot Volume: _____ (uL)

Number TICs found: 3 CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1. 541059	Cyclotrisiloxane, hexamethyl	11.89	10	JN
2.	Unknown Siloxane	17.12	180	-
3.	Unknown Siloxane	21.30	38	-

EL
12-13-93

0000049

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

CNA61

ORIGINAL
RECEIVED

Name: NYTEST ENV INC

Contract: 9320437

Lab Code: NYTEST

Case No.: 20899

SAS No.: _____

SDG No.: CNA51

Matrix: (soil/water) SOIL

Lab Sample ID: 1837914

Sample wt/vol: 5.0 (g/mL) G

Lab File ID: N3070

Level: (low/med) LOW

Date Received: 09/30/93

% Moisture: not dec. 26

Date Analyzed: 10/06/93

GC Column: CAP ID: 0.530 (mm)

Dilution Factor: 1.0

Soil Extract Volume: _____ (uL)

Soil Aliquot Volume: _____ (uL)

CONCENTRATION UNITS:

Number TICs found: 0

(ug/L or ug/Kg) UG/KG

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q

0000041

1E
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

CNA62

Lab Name: NYTEST ENV INC Contract: 9320437

Lab Code: NYTEST Case No.: 20899 SAS No.: _____ SDG No.: CNA51

Matrix: (soil/water) SOIL Lab Sample ID: 1837915

Sample wt/vol: 5.0 (g/mL) G Lab File ID: R3071

Level: (low/med) LOW Date Received: 09/30/93

% Moisture: not dec. 27 Date Analyzed: 10/06/93

GC Column: CAP ID: 0.530 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____ (uL) Soil Aliquot Volume: _____ (uL)

Number TICs found: 0 CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/KG

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q

0000043

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDSORIGINAL
(Rev)

CNA63

Lab Name: NYTEST ENV INCContract: 9320437Lab Code: NYTESTCase No.: 20899

SAS No.: _____

SDG No.: CNA51Matrix: (soil/water) SOILLab Sample ID: 1837916Sample wt/vol: 5.0 (g/mL) GLab File ID: N3072Level: (low/med) LOWDate Received: 09/30/93% Moisture: not dec. 20Date Analyzed: 10/06/93GC Column: CAP ID: 0.530 (mm)Dilution Factor: 1.0

Soil Extract Volume: _____ (uL)

Soil Aliquot Volume: _____ (uL)

CONCENTRATION UNITS:

Number TICs found: 1(ug/L or ug/Kg) UG/KG

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1. 55429851	Benzeneethanamine, N-[(penta	21.28	7	JN

0000045

1E
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

4
CNA67
6L
12/11/93

Lab Name: NYTEST ENV INC Contract: 9320437

Lab Code: NYTEST Case No.: 20899 SAS No.: _____ SDG No.: CNA51

Matrix: (soil/water) SOIL Lab Sample ID: 1837919

Sample wt/vol: 5.0 (g/mL) G Lab File ID: N3075

Level: (low/med) LOW Date Received: 09/30/93

% Moisture: not dec. 22 Date Analyzed: 10/06/93

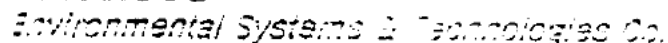
GC Column: CAP ID: 0.530 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____ (uL) Soil Aliquot Volume: _____ (uL)

Number TICs found: 0
CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/KG

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q

0000047



Phone: (410) 268-7705
Fax: (410) 268-8472

SUBJECT: INORGANIC DATA VALIDATION, Case 20899 (IM1 LEVEL)

[illegible]

INORGANIC DATA REVIEWER SENIOR OVERSIGHT CHEMIST

CYNTHIA E. CAPORALE
ESAT REGIONAL PROJECT OFFICER

(b) (4)(b) (4)(b) (4)(b) (4)(b) (4)
 (b) (4)(b) (4)(b) (4)(b) (4)(b) (4)

ESAT TEAM MANAGER

The set of samples for case 20899 consisted of five (5) filtered, ten (10) unfiltered and four (4) soil samples. Included in the case were one (1) filtered and one (1) unfiltered field blanks. The samples were analyzed for total metals by ETS Analytical Services (ETS) according to the Contract Laboratory Program (CLP) Special Analytical Services (SAS) Statement of Work (SOW) ILM02.1.

All samples were successfully analyzed.

The laboratory reported the data in two (2) separate Sample Delivery Groups (SDGs). The data were reviewed and qualified separately per each SDG.

Areas of concern with respect to data usability are listed according to the seriousness of the problem. These include:

The filtered field blank (FB) had a reported result greater than the Instrument Detection Limit (IDL) for the iron (Fe) analyte. The reported results which are less than five times ($<5x$) the blank concentration for this analyte in the affected samples may be biased high and have been qualified "B".

The continuing calibration blank (CCB) had reported results greater than the IDL for the analytes listed

below. The reported results which are less than five times (<5x) the blank concentrations for these analytes in the affected samples may be biased high and have been qualified "B".

<u>Analytes</u>	<u>Matrix</u>
selenium (Se)	Filtered, Unfiltered
Lead (Pb)	Unfiltered
thallium (Tl)	Unfiltered, Soil

The soil laboratory duplicate result was outside of the control limit (35% RPD, $\pm 2 \times \text{CRDL}$) for the nickel (Ni) and Pb analytes. The reported results for these analytes are estimated and have been qualified "J".

The soil matrix spike recoveries were low (30% - 75%) for the antimony (Sb), cadmium (Cd), copper (Cu), manganese (Mn) and Se analytes. The quantitation limits and reported results for these analytes may be biased low and have been qualified "UL" and "L", respectively.

The analytical spike recovery was low (<85%) for the Se analyte in sample MCLF56. The reported result in this sample may be biased low, however, the qualifier "L" has been superseded by the "B" qualifier.

NOTES

The laboratory flagged the cobalt (Co) results on the soil Form Is with a * denoting laboratory duplicate result outside of the contractual control limits ($\pm \text{CRDL}$). However, the duplicate result was within the technical control limit ($\pm 2 \times \text{CRDL}$) and therefore, no data were qualified for this analyte.

The analytical spike recoveries were high (>115%) for the Se analyte in samples MCLF57, MCLF61 and for the Tl analyte in sample MCLF61. These analytes were not detected above the IDL in these samples. High recoveries do not affect quantitation limits, therefore, no data were qualified.

Soil samples reported results are calculated on the basis of the raw data values (in ug/L), the gram weight of sample used, the volume of the digestate, and the % solids according to the following equation:

$$\text{mg/Kg} = \frac{(\text{raw value, ug/L}) (\text{digestate volume, L})}{(\text{weight, g}) (\% \text{ solids}/100)}$$

To obtain quantitation limits, insert the IDL (Form X)

ORIGINAL
10/20/81

for the raw value; refer to Form XIII to obtain each sample preparation weight and volume used. The quantitation limits thus obtained are specific for each sample and preparation method.

The data were reviewed in accordance with the Innovative Approaches (Level IM1) for validation of Inorganic Data, September, 1992 and the National Functional Guidelines for Evaluating Inorganic Analyses, with modifications for use within Region III.

INFORMATION REGARDING REPORT CONTENT

ATTACHMENTS

APPENDIX A ANNOTATED FORM Is
APPENDIX B GLOSSARY OF DATA QUALIFIER CODES
APPENDIX C SUPPORT DOCUMENTATION
SB312A01.BTC

APPENDIX B

GLOSSARY OF DATA QUALIFIER CODES (INORGANIC)

CODES RELATED TO IDENTIFICATION

(confidence concerning presence or absence of analytes):

U = Not detected. The associated number indicates approximate sample concentration necessary to be detected.

(NO CODE) = Confirmed identification.

B = Not detected substantially above the level reported in laboratory or field blanks.

R = Unusable result. Analyte may or may not be present in the sample. Supporting data necessary to confirm result.

CODES RELATED TO QUANTITATION

(can be used for both positive results and sample quantitation limits):

J = Analyte Present. Reported value may not be accurate or precise.

K = Analyte present. Reported value may be biased high. Actual value is expected to be lower.

L = Analyte present. Reported value may be biased low. Actual value is expected to be higher.

[] = Analyte present. As values approach the IDL the quantitation may not be accurate.

UJ = Not detected, quantitation limit may be inaccurate or imprecise.

UL = Not detected, quantitation limit is probably higher.

OTHER CODES

Q = No analytical result.

SAMPLE NO.
 TH1 Level
 MCLF46

1
 INORGANIC ANALYSIS DATA SHEET

Lab Name: ETS Analytical Services

Contract: 68-D2-0048

Lab Code: ETS

Case No.: 20899

SAS No.:

SDG No.: MCLF46

Matrix (soil/water): WATER

Lab Sample ID: 147294

Level (low/med): LCW

Date Received: 09/30/93

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	A	V	M
7429-90-5	Aluminum	46.0	U				P
7440-36-0	Antimony	51.0	U				P
7440-38-2	Arsenic	1.0	U				F
7440-39-3	Barium	10.3	B				P
7440-41-7	Beryllium	1.0	U				P
7440-43-3	Cadmium	5.0	U				P
7440-70-2	Calcium	10000					P
7440-47-3	Chromium	7.0	U				P
7440-48-4	Cobalt	8.0	U				P
7440-50-8	Copper	6.0	U				P
7439-89-6	Iron	14.1	B		B		P
7439-92-1	Lead	1.0	U				F
7439-95-4	Magnesium	5100					P
7439-96-5	Manganese	1.0	U				P
7439-97-6	Mercury	0.20	U				CV
7440-02-0	Nickel	12.0	U				P
7440-09-7	Potassium	904	U				P
7782-49-2	Selenium	2.5	B		B		F
7440-22-4	Silver	4.0	U				P
7440-23-5	Sodium	3300	B				P
7440-28-0	Thallium	2.0	U				F
7440-52-2	Vanadium	7.0	U				P
7440-66-6	Zinc	10.0	U				P
	Cyanide				a		

Color Before: COLORLESS

Clarity Before: CLEAR

Texture:

Color After: COLORLESS

Clarity After: CLEAR

Artifacts:

Comments:

QV = Qualifier after Validation.

ENVIROFORMS/INORGANIC CLP

INORGANIC ANALYSIS DATA SHEET

Location: - BSP. HW. C2
Date: - 9/29/93
Filtered of 5 HCLF52
Duplicate of HCLF49
SAMPLE NO.
MCLF47

Lab Name: ETS Analytical Services

Contract: 68-D2-0048

Lab Code: ETS

Case No.: 20899

SAS No.:

SDG No.: MCLF47

Matrix (soil/water): WATER

Lab Sample ID: 147295

Level (low/med): LOW

IMI level

Date Received: 09/30/93

3 Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	av	M
7429-90-5	Aluminum	46.0	U			P
7440-36-0	Antimony	51.0	U			P
7440-38-2	Arsenic	1.0	U			F
7440-39-3	Barium	*58.3	B			P
7440-41-7	Beryllium	1.0	U			P
7440-43-2	Cadmium	5.0	U			P
7440-70-2	Calcium	*80100				P
7440-47-3	Chromium	7.0	U			P
7440-48-4	Cobalt	8.0	U			P
7440-50-8	Copper	6.0	U			P
7439-89-6	Iron	*1030				P
7439-92-1	Lead	1.0	U			F
7439-95-4	Magnesium	12200				P
7439-96-5	Manganese	*2900				P
7439-97-6	Mercury	0.20	U			CV
7440-02-0	Nickel	12.0	U			P
7440-09-7	Potassium	1040	B			P
7782-49-2	Selenium	2.0	U			F
7440-22-4	Silver	4.0	U			P
7440-23-5	Sodium	*7050				P
7440-28-0	Thallium	2.0	U			F
7440-62-2	Vanadium	7.0	U			P
7440-66-6	Zinc	10.0	U			P
	Cyanide				a	

Color Before: COLORLESS

Clarity Before: CLEAR

Texture:

Color After: COLORLESS

Clarity After: CLEAR

Artifacts:

Comments: av = Qualifier after Validation.

ENVIROFORMS/INORGANIC CLP

1
INORGANIC ANALYSIS DATA SHEET

Location: BSH HW 03
Date: 9/29/93
Filtered of MCLF 53
SAMPLE NO. 1
MCLF48

Lab Name: ETS Analytical Services

Contract: 68-D2-0048

Lab Code: ETS

Case No.: 20899

SAS No.:

SDG No.: MCLF46

Matrix (soil/water): WATER

Lab Sample ID: 147296

Level (low/med): LOW

Date Received: 09/30/93

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	QAV	M
7429-90-5	Aluminum	46.0	U		P
7440-36-0	Antimony	51.0	U		P
7440-38-2	Arsenic	1.0	U		F
7440-39-3	Barium	51.9	B		P
7440-41-7	Beryllium	1.0	U		P
7440-43-9	Cadmium	5.0	U		P
7440-70-2	Calcium	60300			P
7440-47-3	Chromium	7.0	U		P
7440-48-4	Cobalt	8.0	U		P
7440-50-8	Copper	6.0	U		P
7439-89-6	Iron	11.6	B	B	P
7439-92-1	Lead	1.0	U		F
7439-95-4	Magnesium	8090			P
7439-96-5	Manganese	1540			P
7439-97-6	Mercury	0.20	U		CV
7440-02-0	Nickel	12.0	U		P
7440-09-7	Potassium	1630	B		P
7782-49-2	Selenium	2.0	U		F
7440-22-4	Silver	4.0	U		P
7440-23-5	Sodium	21300			P
7440-28-0	Thallium	2.0	U		F
7440-62-2	Vanadium	7.0	U		P
7440-66-6	Zinc	10.0	U		P
	Cyanide			A	

Color Before: COLORLESS

Clarity Before: CLEAR

Texture:

Color After: COLORLESS

Clarity After: CLEAR

Artifacts:

Comments: QV = Qualifier after Validation.

Location: B SP. MW. 21
Date: 9/29/93
Filtered of HCLF5
Duplicate of HCLF47

ENVIROFORMS/INORGANIC CLP

1
INORGANIC ANALYSIS DATA SHEET

SAMPLE NO.
IMI Level

MCLF49

Lab Name: ETS Analytical Services

Contract: 68-D2-0048

Lab Code: ETS

Case No.: 20899

SAS No.:

SDG No.: MCLF46

Matrix (soil/water): WATER

Lab Sample ID: 147297

Level (low/med): LOW

Date Received: 09/30/93

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	QAV	M
7429-90-5	Aluminum	46.0	U		P
7440-36-0	Antimony	51.0	U		P
7440-38-2	Arsenic	1.0	U		P
7440-39-3	Barium	55.0	U		P
7440-41-7	Beryllium	1.0	U		P
7440-43-3	Cadmium	5.0	U		P
7440-70-2	Calcium	79900	U		P
7440-47-3	Chromium	7.0	U		P
7440-48-4	Cobalt	8.0	U		P
7440-50-8	Copper	6.0	U		P
7439-89-6	Iron	1050	U		P
7439-92-1	Lead	1.0	U		P
7439-95-4	Magnesium	11900	U		P
7439-96-5	Manganese	2820	U		P
7439-97-6	Mercury	0.20	U		CV
7440-02-0	Nickel	12.0	U		P
7440-09-7	Potassium	904	U		P
7782-49-2	Selenium	2.0	U		P
7440-22-4	Silver	4.0	U		P
7440-23-5	Sodium	6850	U		P
7440-28-0	Thallium	2.0	U		P
7440-62-2	Vanadium	7.0	U		P
7440-66-6	Zinc	10.0	U		P
	Cyanide			Q	

Color Before: COLORLESS

Clarity Before: CLEAR

Texture:

Color After: COLORLESS

Clarity After: CLEAR

Artifacts:

Comments:

QV = Qualifier after Validation

INORGANIC ANALYSIS DATA SHEET

Location: BSP HW-15
Date: 9/29/93
Filtered of MCLF 55
SAMPLE NO. 141 Level

MCLF50

Lab Name: ETS Analytical Services

Contract: 68-D2-0048

Lab Code: ETS

Case No.: 20899

SAS No.:

SDG No.: MCLF4

Matrix (soil/water): WATER

Lab Sample ID: 147298

Level (low/med): LCW

Date Received: 09/30/93

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	QAV	M
7429-90-5	Aluminum	46.0	U		P
7440-36-0	Antimony	51.0	U		P
7440-38-2	Arsenic	1.0	U		F
7440-39-3	Barium	53.0	B		P
7440-41-7	Beryllium	1.0	U		P
7440-43-3	Cadmium	5.0	U		P
7440-70-2	Calcium	77400			P
7440-47-3	Chromium	7.0	U		P
7440-48-4	Cobalt	8.0	U		P
7440-50-8	Copper	6.0	U		P
7439-89-6	Iron	299			P
7439-92-1	Lead	1.0	U		F
7439-95-4	Magnesium	11300			P
7439-96-3	Manganese	2160			P
7439-97-6	Mercury	0.99			CV
7440-02-0	Nickel	12.0	U		P
7440-09-7	Potassium	904	U		P
7782-49-2	Selenium	2.0	U		F
7440-22-4	Silver	4.0	U		P
7440-23-5	Sodium	11100			P
7440-28-0	Thallium	2.0	U		F
7440-62-2	Vanadium	7.0	U		P
7440-66-6	Zinc	10.0	U		P
	Cyanide				P

Color Before: COLORLESS

Clarity Before: CLEAR

Texture:

Color After: COLORLESS

Clarity After: CLEAR

Artifacts:

Comments:

av: Qualifier after Validation.

Location: B&P.FB.01

Date: 9/29/93

ENVIROFORMS/INORGANIC CLP

Field Blank

SAMPLE NO.

IMI Leve

INORGANIC ANALYSIS DATA SHEET

Filtred

MCLF98

Lab Name: ETS Analytical Services

Contract: 68-D2-0048

Lab Code: ETS

Case No.: 20899

SAS No.:

SDG No.: MCLF4

Matrix (soil/water): WATER

Lab Sample ID: 147299

Level (low/med): LOW

Date Received: 09/30/93

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	QEV	M
7429-90-5	Aluminum	46.0	U		P
7440-36-0	Antimony	51.0	U		P
7440-38-2	Arsenic	1.0	U		F
7440-39-3	Barium	2.0	U		P
7440-41-7	Beryllium	1.0	U		P
7440-43-9	Cadmium	5.0	U		P
7440-70-2	Calcium	109	B		P
7440-47-3	Chromium	7.0	U		P
7440-48-4	Cobalt	8.0	U		P
7440-50-8	Copper	6.0	U		P
7439-89-6	Iron	11.3	B		P
7439-92-1	Lead	1.0	U		F
7439-95-4	Magnesium	58.0	U		P
7439-96-5	Manganese	1.0	U		P
7439-97-6	Mercury	0.20	U		CV
7440-02-0	Nickel	12.0	U		P
7440-09-7	Potassium	904	U		P
7782-49-2	Selenium	2.0	U		F
7440-22-4	Silver	4.0	U		P
7440-23-5	Sodium	103	U		P
7440-28-0	Thallium	2.0	U		F
7440-62-2	Vanadium	7.0	U		P
7440-66-6	Zinc	10.0	U		P
	Cyanide			a	

Color Before: COLORLESS

Clarity Before: CLEAR

Texture:

Color After: COLORLESS

Clarity After: CLEAR

Artifacts:

Comments:

QV = Qualifier after Validation.

Location: BSP. #1W-16

Date: 9/24/93

Filtered

MCLF56

SAMPLE NO.

IHI detail

INORGANIC ANALYSIS DATA SHEET

MCLF99

Lab Name: ETS Analytical Services

Contract: 68-D2-0048

Lab Code: ETS

Case No.: 20899

SAS No.:

SDG No.: MCLF46

Matrix (soil/water): WATER

Lab Sample ID: 147300

Level (low/med): LOW

Date Received: 09/30/93

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	QAV	M
7429-90-5	Aluminum	46.0	U		P
7440-36-0	Antimony	51.0	U		P
7440-38-2	Arsenic	1.0	U		F
7440-39-3	Barium	15.1	B		P
7440-41-7	Beryllium	1.0	U		P
7440-43-9	Cadmium	5.0	U		P
7440-70-2	Calcium	75100			P
7440-47-3	Chromium	7.0	U		P
7440-48-4	Cobalt	8.0	U		P
7440-50-8	Copper	6.0	U		P
7439-89-6	Iron	10.0	U		P
7439-92-1	Lead	1.0	U		F
7439-95-4	Magnesium	10800			P
7439-96-5	Manganese	1.0	U		P
7439-97-6	Mercury	0.20	U		CV
7440-02-0	Nickel	12.0	U		P
7440-09-7	Potassium	904	U		P
7782-49-2	Selenium	2.0	U		F
7440-22-4	Silver	4.0	U		P
7440-23-5	Sodium	10000			P
7440-28-0	Thallium	2.0	U		F
7440-62-2	Vanadium	7.0	U		P
7440-66-6	Zinc	10.0	U		P
	Cyanide				

Color Before: COLORLESS

Clarity Before: CLEAR

Texture:

Color After: COLORLESS

Clarity After: CLEAR

Artifacts:

Comments:

av = Qualifier after Validation

Date: 9/29/93

Unfiltered of HCLF4

SAMPLE NO.

IHI Level

MCLF51

INORGANIC ANALYSIS DATA SHEET

Lab Name: ETS Analytical Services

Contract: 68-D2-0048

Lab Code: ETS

Case No.: 20899

SAS No.:

SDG No.: MCLF4

Matrix (soil/water): WATER

Lab Sample ID: 147301

Level (low/med): LOW

Date Received: 09/30/93

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	QAV	M
7429-90-5	Aluminum	46.0	U		P
7440-36-0	Antimony	51.0	U		P
7440-38-2	Arsenic	1.0	U		F
7440-39-3	Barium	10.1	B		P
7440-41-7	Beryllium	1.0	U		P
7440-43-9	Cadmium	5.0	U		P
7440-70-2	Calcium	10200	U		P
7440-47-3	Chromium	7.0	U		P
7440-48-4	Cobalt	8.0	U		P
7440-50-8	Copper	6.0	U		P
7439-89-6	Iron	207	U		P
7439-92-1	Lead	1.0	U		F
7439-95-4	Magnesium	5130	U		P
7439-96-5	Manganese	2.1	B		P
7439-97-6	Mercury	0.20	U		CV
7440-02-0	Nickel	12.0	U		P
7440-09-7	Potassium	4	U		P
7782-49-2	Selenium	2.0	U		F
7440-22-4	Silver	4.0	U		P
7440-23-5	Sodium	3360	B		P
7440-28-0	Thallium	2.0	U		F
7440-62-2	Vanadium	7.0	U		P
7440-66-6	Zinc	10.0	U		P
	Cyanide	10.0	U		C

Color Before: COLORLESS

Clarity Before: CLEAR

Texture:

Color After: COLORLESS

Clarity After: CLEAR

Artifacts:

Comments:

QV = Qualifier after Validation.

Location: BSP, MW.02

Date: 9/29/93

ENVIROFORMS/INORGANIC CLP

Unfiltered of MCLF

Duplicate of MCLF54

SAMPLE NO.
IHI Level

INORGANIC ANALYSIS DATA SHEET

MCLF52

Lab Name: ETS Analytical Services

Contract: 68-D2-0048

Lab Code: ETS

Case No.: 20899

SAS No.:

SDG No.: MCLF46

Matrix (soil/water): WATER

Lab Sample ID: 147302

Level (low/med): LOW

Date Received: 09/30/93

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	QV	M
7429-90-5	Aluminum	46.0	U			P
7440-36-0	Antimony	51.0	U			P
7440-38-2	Arsenic	1.0	U			F
7440-39-3	Barium	59.9	B			P
7440-41-7	Beryllium	1.0	U			P
7440-43-3	Cadmium	5.0	U			P
7440-70-2	Calcium	30500				P
7440-47-3	Chromium	7.0	U			P
7440-48-4	Cobalt	3.0	U			P
7440-50-8	Copper	5.0	U			P
7439-89-6	Iron	925				P
7439-92-1	Lead	1.0	U			F
7439-95-4	Magnesium	12200				P
7439-96-3	Manganese	2970				P
7439-97-5	Mercury	0.20	U			CV
7440-02-0	Nickel	12.0	U			P
7440-09-7	Potassium	904	U			P
7782-49-2	Selenium	2.0	U			F
7440-22-4	Silver	4.0	U			P
7440-23-5	Sodium	7050				P
7440-28-0	Thallium	2.0	U			F
7440-62-2	Vanadium	7.0	U			P
7440-66-6	Zinc	10.0	U			P
	Cyanide	10.0	U			C

Color Before: COLORLESS

Clarity Before: CLEAR

Texture:

Color After: COLORLESS

Clarity After: CLEAR

Artifacts:

Comments:

QV = Qualifier after Validation

ORIGINAL
(Red)

ENVIROFORMS/INORGANIC CLP

Location: BSP, HW.03

Date: 9/29/93

Unfiltered of MCLF48

SAMPLE NO.

IMI Level

MCLF53

1
INORGANIC ANALYSIS DATA SHEET

Lab Name: ETS Analytical Services

Contract: 68-D2-0048

Lab Code: ETS

Case No.: 20899

SAS No.:

SDG No.: MCLF46

Matrix (soil/water): WATER

Lab Sample ID: 147303

Level (low/med): LOW

Date Received: 09/30/93

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	1140			P
7440-36-0	Antimony	51.0	U		P
7440-38-2	Arsenic	1.0	U		F
7440-39-3	Barium	53.7	B		P
7440-41-7	Beryllium	1.0	U		P
7440-43-8	Cadmium	5.0	U		P
7440-70-2	Calcium	66300			P
7440-47-3	Chromium	7.0	U		P
7440-48-4	Cobalt	3.7	B		P
7440-50-8	Copper	6.0	U		P
7439-89-6	Iron	2800			P
7439-92-1	Lead	3.4		B	F
7439-95-4	Magnesium	8900			P
7439-96-5	Manganese	1920			P
7439-97-6	Mercury	0.20	U		CV
7440-02-0	Nickel	12.0	U		P
7440-09-7	Potassium	1450	B		P
7782-49-2	Selenium	2.0	U		F
7440-22-4	Silver	4.0	U		P
7440-23-5	Sodium	22100			P
7440-28-0	Thallium	2.0	U		F
7440-52-2	Vanadium	7.0	U		P
7440-66-6	Zinc	10.0	U		P
	Cyanide	10.0	U		C

Color Before: COLORLESS

Clarity Before: OPAQUE

Texture:

Color After: COLORLESS

Clarity After: CLEAR

Artifacts:

Comments:

av = Qualifier after Validation.

ENVIROFORMS/INORGANIC CLP

1
INORGANIC ANALYSIS DATA SHEET

Location: BSP, HW. 21
Date: 9/29/93
Unfiltered & MCLF49
Duplicate & MCLF49
SAMPLE NO. 7
IHI Level

MCLF54

Lab Name: ETS Analytical Services

Contract: 68-D2-0048

Lab Code: ETS

Case No.: 20899

SAS No.:

SDG No.: MCLF46

Matrix (soil/water): WATER

Lab Sample ID: 147304

Level (low/med): LCW

Date Received: 09/30/93

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	QAV	M
7429-90-5	Aluminum	46.0	U		P
7440-36-0	Antimony	51.0	U		P
7440-33-2	Arsenic	1.0	U		F
7440-39-3	Barium	51.4	B		P
7440-41-7	Beryllium	1.0	U		P
7440-43-3	Cadmium	5.0	U		P
7440-70-2	Calcium	83600			P
7440-47-3	Chromium	7.0	U		P
7440-48-4	Cobalt	8.0	U		P
7440-50-8	Copper	6.0	U		P
7439-89-6	Iron	947			P
7439-92-1	Lead	1.0	U		F
7439-95-4	Magnesium	12600			P
7439-96-5	Manganese	3070			P
7439-97-6	Mercury	0.20	U		CV
7440-02-0	Nickel	12.0	U		P
7440-09-7	Potassium	904	U		P
7782-49-2	Selenium	2.0	U		F
7440-22-4	Silver	4.0	U		P
7440-23-5	Sodium	17330			P
7440-28-0	Thallium	2.0	B	B	F
7440-52-2	Vanadium	7.0	U		P
7440-56-6	Zinc	10.0	U		P
	Cyanide	10.0	U		C

Color Before: COLORLESS

Clarity Before: CLEAR

Texture:

Color After: COLORLESS

Clarity After: CLEAR

Artifacts:

Comments:

QV = Qualifier after Validation.

Location: DSR. 174.15
Date: 9/29/93
Unfiltered of MCLF5

1
INORGANIC ANALYSIS DATA SHEET

SAMPLE NO.
IMI Level
MCLF55

Lab Name: ETS Analytical Services

Contract: 68-D2-0048

Lab Code: ETS

Case No.: 20899

SAS No.:

SDG No.: MCLF45

Matrix (soil/water): WATER

Lab Sample ID: 147305

Level (low/med): LOW

Date Received: 09/30/93

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Qav	M
7429-90-5	Aluminum	46.0	U		P
7440-36-0	Antimony	51.0	U		P
7440-38-2	Arsenic	1.0	U		F
7440-39-3	Barium	54.5	B		P
7440-41-7	Beryllium	1.0	U		P
7440-43-9	Cadmium	5.0	U		P
7440-70-2	Calcium	79400			P
7440-47-3	Chromium	7.0	U		P
7440-48-4	Cobalt	8.0	U		P
7440-50-8	Copper	5.0	U		P
7439-89-6	Iron	312	U		P
7439-92-1	Lead	1.0	U		F
7439-95-4	Magnesium	11400			P
7439-96-5	Manganese	2230			P
7439-97-6	Mercury	0.20	U		CV
7440-02-0	Nickel	12.0	U		P
7440-09-7	Potassium	904	U		P
7782-49-2	Selenium	2.0	U		F
7440-22-4	Silver	4.0	U		P
7440-23-5	Sodium	11400			P
7440-28-0	Thallium	2.0	U		F
7440-62-2	Vanadium	7.0	U		P
7440-66-6	Zinc	10.0	U		P
	Cyanide	10.0	U		C

Color Before: COLORLESS

Clarity Before: CLEAR

Texture:

Color After: COLORLESS

Clarity After: CLEAR

Artifacts:

Comments:

QV = Qualifier after Validation.

ENVIROFORMS/INORGANIC CLP

INORGANIC ANALYSIS DATA SHEET

Location: BSR, FD-01
Date: 9/29/93
Field Blank
Unfiltered
SAMPLE NO.
THI Level

MCLF60

Lab Name: ETS Analytical Services

Contract: 68-D2-0048

Lab Code: ETS

Case No.: 20899

SAS No.:

SDG No.: MCLF46

Matrix (soil/water): WATER

Lab Sample ID: 147310

Level (low/med): LOW

Date Received: 09/30/93

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	av	M
7429-90-5	Aluminum	46.0	U			P
7440-36-0	Antimony	51.0	U			P
7440-38-2	Arsenic	1.0	U			F
7440-39-3	Barium	2.0	U			P
7440-41-7	Beryllium	1.0	U			P
7440-43-3	Cadmium	5.0	U			F
7440-70-2	Calcium	132	B			P
7440-47-3	Chromium	7.0	U			P
7440-48-4	Cobalt	8.0	U			F
7440-50-8	Copper	6.0	U			P
7439-89-6	Iron	10.0	U			P
7439-92-1	Lead	1.0	U			F
7439-95-4	Magnesium	58.0	U			P
7439-96-5	Manganese	1.0	U			P
7439-97-6	Mercury	0.20	U			CV
7440-02-0	Nickel	12.0	U			P
7440-09-7	Potassium	904	U			P
7782-49-2	Selenium	2.0	U			F
7440-22-4	Silver	4.0	U			P
7440-23-5	Sodium	103	U			P
7440-28-0	Thallium	2.0	U			F
7440-62-2	Vanadium	7.0	U			P
7440-66-6	Zinc	10.0	U			P
	Cyanide	10.0	U			C

Color Before: COLORLESS

Clarity Before: CLEAR

Texture:

Color After: COLORLESS

Clarity After: CLEAR

Artifacts:

Comments:

av = Qualifier after Validation.

ORIGINAL
(Rev)

ENVIROFORMS/INORGANIC CLP

Location: BSP, HW. 16

Date: 9/29/93

Unfettered of HCLF 99

SAMPLE NO.

IHI Level

MCLF56

1
INORGANIC ANALYSIS DATA SHEET

Lab Name: ETS Analytical Services

Contract: 68-D2-0048

Lab Code: ETS

Case No.: 20899

SAS No.:

SDG No.: MCLF46

Matrix (soil/water): WATER

Lab Sample ID: 147306

Level (low/med): LOW

Date Received: 09/30/93

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	QV	M
7429-90-3	Aluminum	2990				P
7440-36-0	Antimony	51.0	U			P
7440-38-2	Arsenic	1.7	B			F
7440-39-3	Barium	34.4	B			P
7440-41-7	Beryllium	1.0	U			P
7440-43-9	Cadmium	5.0	U			P
7440-70-2	Calcium	77400				P
7440-47-3	Chromium	23.4				P
7440-48-4	Cobalt	8.0	U			P
7440-50-8	Copper	9.4	B			P
7439-89-6	Iron	13500				P
7439-92-1	Lead	7.8				F
7439-95-4	Magnesium	12400				P
7439-96-5	Manganese	616				P
7439-97-6	Mercury	0.20	U			CV
7440-02-0	Nickel	20.1	B			P
7440-09-7	Potassium	1110	B			P
7782-49-2	Selenium	2.6	B	W	B	F
7440-22-4	Silver	4.0	U			P
7440-23-5	Sodium	9980				P
7440-28-0	Thallium	2.0	U			F
7440-62-2	Vanadium	7.0	U			P
7440-66-6	Zinc	24.2				P
	Cyanide	10.0	U			C

Color Before: BEIGE

Clarity Before: CLOUDY

Texture:

Color After: COLORLESS

Clarity After: CLEAR

Artifacts:

Comments:

QV = Qualifier after Validation.

ENVIROFORMS/INORGANIC CLP

1
INORGANIC ANALYSIS DATA SHEET

Location: B3P. SW.01
Date: 9/29/93
Unfiltered

SAMPLE NO.

IHL Level

MCLF57

Lab Name: ETS Analytical Services

Contract: 68-D2-0048

Lab Code: ETS

Case No.: 20899

SAS No.:

SDG No.: MCLF46

Matrix (soil/water): WATER

Lab Sample ID: 147307

Level (low/med): LOW

Date Received: 09/30/93

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	QAV	M
7429-90-5	Aluminum	141	B		P
7440-36-0	Antimony	51.0	U		P
7440-38-2	Arsenic	1.0	U		F
7440-39-3	Barium	17.0	B		P
7440-41-7	Beryllium	1.0	U		P
7440-43-9	Cadmium	5.0	U		P
7440-70-2	Calcium	15800			P
7440-47-3	Chromium	7.0	U		P
7440-48-4	Cobalt	8.0	U		P
7440-50-8	Copper	6.0	U		P
7439-89-6	Iron	429			P
7439-92-1	Lead	1.3	B	B	F
7439-95-4	Magnesium	6480			P
7439-96-5	Manganese	26.3			P
7439-97-6	Mercury	0.20	U		CV
7440-02-0	Nickel	12.0	U		P
7440-09-7	Potassium	904	U		P
7782-49-2	Selenium	2.0	U	W	F
7440-22-4	Silver	4.0	U		P
7440-23-5	Sodium	13800			P
7440-28-0	Thallium	2.0	U		F
7440-62-2	Vanadium	7.0	U		P
7440-66-6	Zinc	10.0	U		P
	Cyanide	10.0	U		C

Color Before: COLORLESS

Clarity Before: CLEAR

Texture:

Color After: COLORLESS

Clarity After: CLEAR

Artifacts:

Comments:

av = Qualifier after Validation

Location: BSP: SW.03

Date: 9/29/93

ENVIROFORMS/INORGANIC CLP

unfiltered

SAMPLE NO.

IHI deval

INORGANIC ANALYSIS DATA SHEET

MCLF58

Lab Name: ETS Analytical Services

Contract: 68-D2-0048

Lab Code: ETS

Case No.: 20899

SAS No.:

SDG No.: MCLF46

Matrix (soil/water): WATER

Lab Sample ID: 147308

Level (low/med): LOW

Date Received: 09/30/93

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	QV	M
7429-90-5	Aluminum	195	B			P
7440-36-0	Antimony	51.0	U			P
7440-38-2	Arsenic	1.0	U			F
7440-39-3	Barium	(21.1)	B			P
7440-41-7	Beryllium	1.0	U			P
7440-43-9	Cadmium	5.0	U			P
7440-70-2	Calcium	20700				P
7440-47-3	Chromium	* 18.4				P
7440-48-4	Cobalt	8.0	U			P
7440-50-8	Copper	6.0	U			P
7439-89-6	Iron	147				P
7439-92-1	Lead	1.0	U			F
7439-95-4	Magnesium	7650				P
7439-96-5	Manganese	* 90.4				P
7439-97-6	Mercury	0.20	U			CV
7440-02-0	Nickel	* 53.5				P
7440-09-7	Potassium	1290	B			P
7782-49-2	Selenium	2.2	B			F
7440-22-4	Silver	4.0	U			P
7440-23-5	Sodium	13100				P
7440-28-0	Thallium	2.0	U			F
7440-62-2	Vanadium	7.0	U			P
7440-66-6	Zinc	10.0	U			P
	Cyanide	10.0	U			C

Color Before: COLORLESS

Clarity Before: CLEAR

Texture:

Color After: COLORLESS

Clarity After: CLEAR

Artifacts:

Comments:

QV = Qualifier after Validation.

ENVIROFORMS/INORGANIC CLP

INORGANIC ANALYSIS DATA SHEET

SAMPLE NO.
IMI Level

MCLF59

Lab Name: ETS Analytical Services

Contract: 68-D2-0048

Lab Code: ETS

Case No.: 20899

SAS No.:

SDG No.: MCLF46

Matrix (soil/water): WATER

Lab Sample ID: 147309

Level (low/med): LCW

Date Received: 09/30/93

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	AV	M
7429-90-5	Aluminum	175	B			P
7440-36-0	Antimony	51.0	U			P
7440-38-2	Arsenic	1.0	U			F
7440-39-3	Barium	23.8	B			P
7440-41-7	Beryllium	1.0	U			P
7440-43-3	Cadmium	5.0	U			P
7440-70-2	Calcium	24400	-			P
7440-47-3	Chromium	13.0	-			P
7440-48-4	Cobalt	8.0	U			P
7440-50-8	Copper	6.0	U			P
7439-89-6	Iron	367	-			P
7439-92-1	Lead	1.3	B		B	F
7439-95-4	Magnesium	9320	-			P
7439-96-3	Manganese	26.7	-			P
7439-97-5	Mercury	0.20	U			CV
7440-02-0	Nickel	12.0	U			P
7440-09-7	Potassium	1650	B			P
7782-49-2	Selenium	2.0	U			F
7440-22-4	Silver	4.0	U			P
7440-23-5	Sodium	15900	-			P
7440-28-0	Thallium	2.0	U			F
7440-62-2	Vanadium	7.0	U			P
7440-66-6	Zinc	33.7	-			P
	Cyanide	10.0	U			C

Color Before: COLORLESS

Clarity Before: CLEAR

Texture:

Color After: COLORLESS

Clarity After: CLEAR

Artifacts:

Comments:

AV = Qualifier after Validation

APPENDIX A
SOIL SAMPLES ANNOTATED FORM Is

Date: 9/29/93

1
INORGANIC ANALYSIS DATA SHEET

SAMPLE NO.
TH level
MCLF61

Lab Name: ETS Analytical Services

Contract: 68-D2-0048

Lab Code: ETS

Case No.: 20899

SAS No.:

SDG No.: MCLF61

Matrix (soil/water): SOIL

Lab Sample ID: 147311

Level (low/med): LOW

Date Received: 09/30/93

% Solids: 70.7

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	AV	M
7429-90-5	Aluminum	6360	-			P
7440-36-0	Antimony	10.5	U	N	VL	P
7440-38-2	Arsenic	10.7	-	S		F
7440-39-3	Barium	25.0	B			P
7440-41-7	Beryllium	0.27	B			P
7440-43-9	Cadmium	2.1	-	N	L	P
7440-70-2	Calcium	487	B			P
7440-47-3	Chromium	23.6	-			P
7440-48-4	Cobalt	12.6	-	*		P
7440-50-8	Copper	26.2	-	N	L	P
7439-89-6	Iron	33000	-			P
7439-92-1	Lead	13.8	-	*	J	F
7439-95-4	Magnesium	1620	-			P
7439-96-5	Manganese	600	-	N	L	P
7439-97-6	Mercury	0.12	U			CV
7440-02-0	Nickel	20.9	-	*	J	P
7440-09-7	Potassium	266	B			P
7782-49-2	Selenium	0.44	U	NW	VL	F
7440-22-4	Silver	0.83	U			P
7440-23-5	Sodium	29.5	B			P
7440-28-0	Thallium	0.22	U	W		F
7440-62-2	Vanadium	15.3	-			P
7440-66-6	Zinc	70.3	-			P
	Cyanide	3.5	U			C

Color Before: BROWN

Clarity Before:

Texture: MEDIUM

Color After: YELLOW

Clarity After:

Artifacts: YES

Comments:

Sample contained twigs and rocks.

AV = qualifier after validation.

Location: BSP SED.02
Date: 9/29/93

ENVIROFORMS/INORGANIC CLP

SAMPLE NO.
INI level
MCLF62

1
INORGANIC ANALYSIS DATA SHEET

Name: ETS Analytical Services

Contract: 68-D2-0048

Lab Code: ETS

Case No.: 20899

SAS No.:

SDG No.: MCLF62

Matrix (soil/water): SCIL

Lab Sample ID: 147312

Level (low/med): LCW

Date Received: 09/30/93

% Solids: 75.6

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	QAV	M
7429-90-5	Aluminum	9960	-		P
7440-36-0	Antimony	10.5	U	N VL	P
7440-38-2	Arsenic	7.3	-		F
7440-39-3	Barium	26.5	B		P
7440-41-7	Beryllium	0.27	B		P
7440-43-9	Cadmium	2.6	-	N L	P
7440-70-2	Calcium	3440	-		P
7440-47-3	Chromium	95.1	-		P
7440-48-4	Cobalt	13.8	-	*	P
7440-50-8	Copper	26.2	-	N L	P
7439-89-6	Iron	35100	-		P
7439-92-1	Lead	34.2	-	S* J	F
7439-95-4	Magnesium	4720	-		P
7439-96-5	Manganese	701	-	N L	P
7439-97-6	Mercury	0.12	U		CV
7440-02-0	Nickel	* 118	-	* J	P
7440-09-7	Potassium	213	B		P
7782-49-2	Selenium	0.40	U	N VL	F
7440-22-4	Silver	0.83	U		P
7440-23-5	Sodium	24.0	B		P
7440-28-0	Thallium	0.29	B	B	F
7440-62-2	Vanadium	16.6	-		P
7440-66-6	Zinc	130	-		P
	Cyanide	3.3	U		C

Color Before: BROWN

Clarity Before:

Texture: MEDIUM

Color After: YELLOW

Clarity After:

Artifacts: YES

Comments:

Sample contained twigs and rocks.

QAV = Qualifier after Validation

1
INORGANIC ANALYSIS DATA SHEET

SAMPLE NO.
IHI Level
MCLF63

Lab Name: ETS Analytical Services

Contract: 68-D2-0048

Lab Code: ETS

Case No.: 20899

SAS No.:

SDG No.: MCLF6

Matrix (soil/water): SOIL

Lab Sample ID: 147313

Level (low/med): LOW

Date Received: 09/30/93

% Solids: 80.1

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	QV	M
7429-90-5	Aluminum	15600	—			P
7440-36-0	Antimony	8.8	U	N	VL	P
7440-38-2	Arsenic	1.3	B			F
7440-39-3	Barium	52.1	—			P
7440-41-7	Beryllium	0.44	B			P
7440-43-9	Cadmium	1.8	—	N	L	P
7440-70-2	Calcium	982	—			P
7440-47-3	Chromium	28.6	—			P
7440-48-4	Cobalt	10.7	—	*		P
7440-50-8	Copper	36.5	—	N	L	P
7439-89-6	Iron	28800	—			P
7439-92-1	Lead	9.2	—	*	J	F
7439-95-4	Magnesium	3840	—			P
7439-96-5	Manganese	200	—	N	L	P
7439-97-6	Mercury	0.12	U			CV
7440-02-0	Nickel	28.5	—	*	J	P
7440-09-7	Potassium	359	B			P
7782-49-2	Selenium	0.40	B	N	L	F
7440-22-4	Silver	0.69	U			P
7440-23-5	Sodium	52.1	B			P
7440-28-0	Thallium	0.23	B		B	F
7440-62-2	Vanadium	26.0	—			P
7440-66-6	Zinc	65.8	—			P
	Cyanide	3.1	U			C

Color Before: GREY

Clarity Before:

Texture: MEDIUM

Color After: YELLOW

Clarity After:

Artifacts: YES

Comments:

Sample contained rocks.

QV = Qualifier after Validation

Date: 9/29/93

SAMPLE NO.

EHI Jow

MCLF64

1
INORGANIC ANALYSIS DATA SHEET

(Red)

Lab Name: ETS Analytical Services

Contract: 68-D2-0048

Lab Code: ETS

Case No.: 20899

SAS No.:

SDG No.: MCLF6

Matrix (soil/water): SOIL

Lab Sample ID: 147314

Level (low/med): LCW

Date Received: 09/30/93

% Solids: 73.0

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	AV	M
7429-90-5	Aluminum	11100	-			P
7440-36-0	Antimony	10.2	U	N	VL	P
7440-38-2	Arsenic	6.2	-	S		F
7440-39-3	Barium	37.0	B			P
7440-41-7	Beryllium	0.30	B			P
7440-43-9	Cadmium	2.4	-	N	L	P
7440-70-2	Calcium	8910	-			P
7440-47-3	Chromium	165	-			P
7440-48-4	Cobalt	16.7	-	*		P
7440-50-8	Copper	26.7	-	N	L	P
7439-89-6	Iron	40400	-			P
7439-92-1	Lead	35.8	-	S*	J	F
7439-95-4	Magnesium	7810	-			P
7439-96-5	Manganese	888	-	N	L	P
7439-97-6	Mercury	0.11	U			CV
7440-02-0	Nickel	128	-	*	J	P
7440-09-7	Potassium	545	B			P
7782-49-2	Selenium	0.39	U	N	VL	F
7440-22-4	Silver	0.80	U			P
7440-23-5	Sodium	35.5	B			P
7440-28-0	Thallium	0.26	B		B	F
7440-62-2	Vanadium	20.4	-			P
7440-66-6	Zinc	153	-			P
	Cyanide	3.4	U			C

Color Before: BROWN

Clarity Before:

Texture: MEDIUM

Color After: YELLOW

Clarity After:

Artifacts: YES

Comments:

Sample contained rocks.

av = Qualifier after Validation.